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TROPICAL DISEASES BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 45] 1948 [No. 4

SUMMARY OF RECENT ABSTRACTS *

III. MALARIA

(*Continued from p.* 228)

Treatment

A most comprehensive survey of antimalarial drugs has been edited by WISELOGLE (p. 1106). It contains a record of the enormous number of compounds tested in the United States during the war. In a series of 6 papers, BRODIE and his colleagues (p. 793) have given an account of the methods devised during the war for estimation of basic organic compounds in biological material, in connexion with the evaluation of the large numbers of chemotherapeutic agents investigated.

A method of standardization of tests for antimalarial activity of drugs has been devised by GINRICH and SCHOCH (p. 970). It is the " quinine equivalent " which is the ratio of the amount of the drug to that of the minimum effective dose of quinine, as observed under well-defined conditions in *P. cathemerium* infections of canaries.

SHUTE (p. 394) points out that strains of malaria parasites vary in virulence and in the amount of antimalarial drug necessary for treatment of the attacks they provoke, and that much more of a drug is needed for a primary attack than for a relapse or reinfection.

RAYMOND (p. 962) describes the Totaquina prepared locally in Tanganyika Territory during the war. PERRET-GENTIL (p. 396) writes favourably of a solution containing quinine gluconate and calcium, for intravenous treatment of *P. vivax* infections. HERTZBERG (p. 26) reports a case of quinine amaurosis in a patient taking therapeutic doses only. SHRAGER and KEAN (p. 170) report a few cases of purpura in both *P. vivax* and *P. falciparum* malaria ; this is a serious complication, and is apparently an allergic reaction to quinine. No case was found in patients treated with atebrin.

KYKER *et al.* (p. 802) describe the formation of antimalarial agents by ultraviolet decomposition of quinine.

In Holland tablets consisting of quinine and pamaquin are used in the treatment of *P. vivax* malaria, to prevent relapse (WINCKEL, p. 696). MOST *et al.* (p. 496), as a result of careful observation of a series of patients, show that a combined quinine-plasmoquine treatment is very much more efficient than

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1947, v. 44. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

quinine alone or mepacrine alone, in preventing subsequent relapses of *P. vivax* malaria. JOHNSTONE (p. 284) shows that relapses, in *P. vivax* infections, after treatment with quinine-pamaquin, are much less common than after treatment with paludrine, even in high dosage.

GORDON *et al.* (p. 176) have found that quinacrine [mepacrine] is the drug of choice, in preference to quinine, in the treatment of relapses of *P. vivax* infections.

For both *P. vivax* and *P. falciparum* infections, ROTENBURG (p. 27) gives acriquine [mepacrine] 0·3 gm. by mouth and at the same time 0·3 gm. by intramuscular injection, followed by 0·3 gm. on the second and third days ; he quotes good results. BANG *et al.* (p. 696) show that mepacrine was better than quinine in treatment of acute attacks of *P. vivax* malaria in New Guinea, and that the two drugs were about equal in treatment of *P. falciparum* infections.

BOYD and KITCHEN (p. 560) inoculated two persons with blood containing *P. vivax* while they were taking mepacrine in therapeutic doses. Subsequent infection by mosquitoes indicated that appreciable immunity had been conferred by this process.

CIUCA *et al.* (p. 559) show that plasmoquine has a distinct action on the gametocytes of *P. vivax*, but that these gametocytes are more resistant than those of *P. falciparum*. DICK and BOWLES (p. 643) have demonstrated the gametocidal effect of plasmoquine in *P. falciparum* infections.

DIMSON and MCMARTIN (p. 32) report on 18 cases of haemoglobinuria in 18,000 Indian troops who had been given pamaquin and mepacrine. They think the condition was a result of over-susceptibility to pamaquin.

Discussing the prevention of malaria from blood transfusion in malarious countries, BRAITHWAITE (p. 961) states that where all precautions were taken except routine treatment of the recipient, malaria continued to be transmitted, but that treatment of the recipient with mepacrine and pamaquin was effective.

LOEB (p. 396) reports on the new quinoline compound Pentaquine, which is about as toxic as pamaquin (too toxic to be used as a suppressive) but which can produce radical cure of *P. vivax* infections, in doses near the toxic level, and if taken together with quinine. HALAWANI *et al.* (p. 698) have treated a few cases of *P. vivax* infection with a quinoline derivative named CAM-AQI. They report some fairly good results, but also some apparently toxic reactions, though the latter are regarded as trivial.

FAIRLEY (p. 175) has contributed a succinct account of the war-time researches carried out on antimalarial drugs in Australia. Mepacrine, sontochin, chloroquine and paludrine are effective suppressants, and paludrine and plasmoquine are causal prophylactics for *P. falciparum*, though the doses of the latter for this effect are too large to be tolerated. GORDON *et al.* (p. 963) compared the action of several of the newer synthetic antimalarial drugs in the treatment of *P. vivax* infections. All were effective in controlling fever and parasitaemia, but they did not show superiority over mepacrine in preventing relapses.

DE OLIVEIRA (p. 285) and HALAWANI *et al.* (p. 792) have tested chloroquine diphosphate (Aralen) in a small series of patients with *P. vivax* or *P. falciparum* infections ; they report favourably on it. JOHNSTONE (p. 396) shows that compound 4430 controls the symptoms of an acute attack of *P. vivax* malaria, but the relapse rate is high. PATIÑO CAMARGO *et al.* (p. 1037) report favourably on compound W7618 (Winthrop) in malaria.

CHENG FANG TSU (p. 699) reports favourably on a preparation of the indigenous Chinese plant *chang shan* (*Dichroa febrifuga*), in the treatment of *P. vivax* and some cases of *P. falciparum* malaria, thus confirming TONKIN & WORK [this *Bulletin*, 1946, v. 43, 1012].

By experiments on *P. falciparum* cultivated in red cells *in vitro*, BLACK (p. 176) has studied the action of various drugs. Paludrine acts on the young schizonts; atebrin, sontochin, chloroquine and quinine on parasites at an earlier stage. The infected red cell therefore appears to be permeable to the drugs before the segmenting stage of the parasite is reached.

DAVEY (p. 646) recounts his observations on the exoerythrocytic stages of *P. gallinaceum* after inoculation of sporozoites. Neither quinine nor mepacrine acts on these stages, but paludrine is a complete causal prophylactic provided that treatment is begun within 4 days of infection with sporozoites. The paper should be read in full for the account of the steps of the author's careful and fruitful investigations. CURD and ROSE (p. 283) discuss a possible mode of action of paludrine, through interference with porphyrin metabolism of malaria parasites. As a result of experiments on *P. cynomolgi* and *P. gallinaceum* cultivated *in vitro* and exposed to serum from animals treated with paludrine, and to paludrine added direct, HAWKING (p. 648) concludes that this drug shows antimalarial activity after undergoing change in the body.

GAGE and ROSE (p. 500) describe a method for estimating paludrine in urine, for which the original should be consulted.

MAEGRAITH *et al.* (p. 501) have investigated the blood and plasma concentrations of paludrine after doses of 500 mgm. (plasma level up to 500 μgm. per litre) and 50 mgm. every 12 hours (up to 150 μgm. per litre). Peak values are reached more quickly than with mepacrine, and one week after administration ceased no paludrine can be detected. For details the original should be consulted. BUTLER *et al.* (p. 1037) show that in chicks the toxic blood level of paludrine is about 10 times as high as in rats, and that the behaviour of the drug in man resembles its behaviour in chicks.

SPINKS and TOTTEY (p. 34) discuss the absorption, distribution and excretion of the antimalarial compound 3349, and SPINKS (p. 35) reports similarly on compound 4430. The same author (p. 793) discusses the absorption, distribution and excretion of paludrine in rats, mice and rabbits. The drug is largely metabolized by the tissues, the blood and plasma levels are low, and it is not retained in the tissues to the same extent as mepacrine.

INNES (p. 877) has shown that intramuscular injection of paludrine causes some local necrosis in animals, and suggests that this route should, as far as possible, be avoided.

FAIRLEY (p. 282) describes the researches on paludrine undertaken in Australia during the war. It proved more efficient than any other drug in the radical cure of *P. falciparum* infection, by the standard course of 0·1 gm. thrice daily for 10 days. It is also a true causal prophylactic for this parasite. In *P. vivax* infections relapses are fewer after paludrine than after other drugs, and it acts as a partial causal prophylactic. Its action in *P. malariae* infections is not fully known. Toxic effects were not seen, even with fairly high doses.

BISHOP and BIRKETT (p. 969) have produced a strain of *P. gallinaceum* resistant to paludrine, by treating infected chickens with small doses, and passaging every few days. The strain was not resistant to mepacrine, nor could similar treatment with mepacrine induce resistance. The paludrine-resistant strain produced exoerythrocytic forms, and developed normally in *Aëdes aegypti*. WILLIAMSON *et al.* (p. 970) have also produced strains of *P. gallinaceum* resistant to paludrine, by similar means. These retained their resistance after passage through mosquitoes, but, though resistant to one derivative of paludrine, were not resistant to quinine or mepacrine, nor could strains resistant to these drugs be produced.

FINDLAY *et al.* (p. 501) investigated certain sulphonamides in the treatment of *P. falciparum* in Europeans during the war; the results were poor. PAGE and

McCall (p. 396) show that sulphadiazine, given for fever with signs of pulmonary disease, delayed the true diagnosis of *P. vivax* infection by eliminating the parasites from the blood, for a time.

Trupp (p. 495) advocates administration of nicotinic acid, in addition to antimalarial drugs, in the treatment of severe *P. falciparum* infections, basing this treatment on a consideration of the pathology of the disease and the action of the drug.

Suppressive Treatment

Maegraith *et al.* (p. 28) show that mepacrine in whole blood is largely concentrated in the white cell layer, but they do not know if it is in the white cells themselves, or in the platelets. The red cells and the plasma contain relatively little, and the plasma concentration is better than whole-blood concentration, as an index of the red cell concentration. They (p. 31) give details of distribution of mepacrine in the tissues of experimental animals, and in various human secretions and tissues. Details should be sought in the original.

Maegraith *et al.* (p. 27) show that a prolonged trial of daily administration of mepacrine to 109 young women volunteers was followed in only one case by serious disorder, and even that, which was a psychosis, was not certainly due to the mepacrine.

Maegraith and his colleagues (p. 498) found no indication that absorption of mepacrine was impaired by continuous administration of suppressive doses. In volunteers the mean plasma concentrations were about 26–28 μgm. per litre on a dose of 0·1 gm. each day, but individual variations were considerable. These workers (pp. 498, 499), working with volunteers, found that when 0·1 gm. mepacrine was given daily, severe exercise under hot, moist conditions did not effect minimum mepacrine levels in blood or plasma, and that the final levels were not affected by the quantity of food taken, or by large amounts of cellulose. Elimination of mepacrine by the bowel varies between individuals, and may be quite considerable, but it does not depend on failure of absorption.

Smith *et al.* (p. 177) show that with small daily doses of mepacrine it takes 4–5 weeks to reach constant plasma levels ; with higher doses the time is shorter. Becker *et al.* (p. 177) found plasma concentrations of atabrine [mepacrine] of 21·3 to 26 microgm. per litre, in men taking 0·1 gm. each day. [The authors refer to levels of 21·3 G/L to 26·0 G/L, but explain that this represents microgrammes per litre. This use of the letter G is likely to lead to confusion.] In the *Archives of Internal Medicine* (p. 28) there is a report from the United States forces on plasma mepacrine levels. On 0·6 gm. each week the level rises slowly for 3–6 weeks, and then remains constant at about 30 microgm. per litre for each 1 gm. taken during one week. Priming doses of 0·3 gm. daily for 6 days raise the level more quickly. There is considerable individual variation in different people, and there is a group with very low levels ; this group was important in the war, since it was necessary to give doses which would prevent malaria even in this group. A hot, humid climate does not affect mepacrine absorption and storage ; there is no correlation between colouring of the skin and plasma mepacrine levels.

Levine and Erlanger (p. 395) failed to find any effect of mepacrine administration on the electrocardiogram. Brown and Rennie (p. 497) discuss mepacrine metabolism in recurring *P. vivax* malaria.

Bang *et al.* (p. 281) found that mepacrine in a dose of 0·1 gm. each day was effective in suppression for troops in the S. Pacific ; a plasma level of 30 microgrammes per litre is satisfactory. In a series of cases of malaria in men who should have been taking 0·1 gm. mepacrine each day, Brown and Rennie (p. 395) found that the usual reason for the apparent failure of suppression was that the men had, in fact, not taken it regularly.

FAIRLEY (p. 398) shows that although in one area of New Guinea the failure of mepacrine suppression was largely due to faulty discipline, there was also a local, relatively mepacrine-resistant, strain of *P. falciparum* for which a double dosage was not too much. This strain was responsible for one-third of the overt attacks of *P. falciparum* malaria. Referring to this paper, SELBY (p. 398) states that discipline was no worse in the area concerned than in other areas, and that in that place it was never possible to arrange DDT spray, as was done elsewhere. He contends that there were many factors involved, and that variations in discipline may not have influenced the matter. FAIRLEY *et al.* (p. 399) investigated the mepacrine-resistant strains of *P. falciparum* referred to above, by inoculating them into volunteers. Even 0·2 gm. mepacrine daily was not always effective in suppression, but paludrine in doses of 0·025 to 0·1 gm. daily was a complete causal prophylactic. No evidence of mepacrine-resistant *P. vivax* was obtained. MACKERRAS (p. 874) refers to this resistant strain of *P. falciparum* in Wewak, and remarks that similar resistance did not occur elsewhere, although for several months the troops were receiving inadequate amounts of mepacrine.

BANG *et al.* (p. 503) found malaria parasites in 14 per cent. of a group of men under rigid mepacrine suppressive treatment, in which there had been only a few attacks of malaria; in a comparable group in which there had been much malaria previously, parasites were found in only 2 of 349. In Burma, under conditions of strenuous combat, 98 per cent. of the men were protected by 1·0 gm. mepacrine each week.

GOLDSMITH (p. 502) reports successful suppression of malaria in labourers on an estate in Assam, who were given either one tablet of chloroquine once each week, or mepacrine each day. There were no cases of intolerance to chloroquine.

In *P. vivax* malaria (New Guinea infections) TRAGER *et al.* (p. 1036) found relapse rates of 61–76 per cent. some 4–7 weeks after cessation of suppressive mepacrine, in men whose acute attacks had been treated with mepacrine and other drugs. After treatment with quinine the relapse rate was 82 per cent.

BANG and HAIRSTON (p. 1038) show that in a body of troops in the S. Pacific, the gametocyte rate in the men and the infection rate in mosquitoes varied in direct relation, and argue that mepacrine suppression prevents infection.

ROBIN and BROCHEN (p. 643) report a great reduction in parasite rates and spleen rates in African children (in Dakar) to whom mepacrine and rhodopraequine were given in several courses during a period of 4 months. PARROT *et al.* (p. 700) show that both mepacrine alone, and mepacrine and pamaquin, given twice each week to the inhabitants of part of Algeria, were effective in prevention of attacks of malaria; the gametocidal action of pamaquin, however, was not considered enough to justify its inclusion.

FINDLAY (p. 763) has reviewed a large amount of literature on the toxicity of mepacrine in man. Lichenoid dermatitis and other forms of dermatitis, toxic psychoses, haematopoietic lesions and eye changes are described and their association with mepacrine is critically discussed. The reader should consult the review itself for details. WILSON (p. 395) discusses lichenoid dermatitis in relation to mepacrine; he thinks that this is the principal, but not necessarily the only, cause of the condition. KIERLAND (p. 499) describes 49 cases of the eruption resembling lichen planus, due to mepacrine. This almost invariably occurred in the older men at risk. The most serious complication was aplastic anaemia, which was always fatal. CUSTER (p. 697) reports that aplastic anaemia was much more common in men, in the S. Pacific, who were taking mepacrine than in those in areas where this was not necessary. In the 57 cases studied there was no evident correlation with any other drug, and in 25 of them the anaemia was preceded by the atypical

lichen planus which has been associated with mepacrine. BAZEMORE *et al.* (p. 559) describe 314 cases of lichenoid dermatitis, and conclude that there is strong evidence that the condition is due to prolonged ingestion of mepacrine, but that the mechanism of action is not known. In susceptible persons mepacrine may produce acute erythema and oedema within a few days, with positive patch test, or the lichenoid fixed eruption after 2–3 months' ingestion. BUTLER (p. 792) discusses 247 patients, in the S. Pacific, with atypical lichen planus; he is not convinced that mepacrine alone is the cause of the eruption, though it is most probably an aetiological agent. NISBET (p. 877) also has reviewed the dermatitis due to mepacrine.

A blue-grey pigmentation of the nail-beds, due to mepacrine, is described by LUTTERLOH and SHALLENBERGER (p. 177).

AGRESS (p. 33) reports 5 cases of severe hepatitis and exfoliative dermatitis, of which 3 were fatal, due to mepacrine, and describes in detail the reasons for deciding that the drug actually caused these conditions in patients sensitive to it. A patch test with mepacrine will detect sensitivity. In an extremely sensitive person a toxic reaction may occur from ingestion of as little as 0·1 gm. of mepacrine.

Control

MACDONALD (p. 182) has published a useful booklet on malaria and its control, written for planters and miners. This cannot be abstracted.

JAME (p. 178) shows that malaria increased in French North Africa during the war, but that in 1944 there was an abrupt decline in incidence. Rainfall was deficient in that year, and antimalarial measures of many kinds were renewed with materials from American sources, which during the early part of the war had been lacking.

HOCKING (p. 1038) makes the point that as a measurement of the efficiency of control, assessment of the number of cases of malaria is too slow and too unreliable. The results of hand-catching of mosquitoes are preferable, and a standard trap hut has been devised. Senior WHITE and RAO (p. 794), on the other hand, have confirmed the contention of Ribbands that the method of hand-catching fails to capture a very considerable proportion of mosquitoes in buildings; spraying with pyrethrum is much more effective for estimating the total mosquito population.

Larvicidal Methods

SERGENT and SERGENT (p. 36) write of the value of *colmatage*, which consists in causing silt-laden waters to deposit their silt in ponds and marshes, as an antilarval measure.

CAMBOURNAC *et al.* (p. 181) write very favourably of DDT in alcoholic solution as a larvicide for *A. maculipennis atroparvus* in ricefields; the alcohol ensures diffusion of the preparation. In ricefields in Kenya neither intermittent irrigation nor larvivorous fish reduced the number of anophelines, but an oil-drip over the inlet channel was of value. GRAINGER (p. 644) shows, moreover, that intermittent irrigation probably decreased the crop.

WILSON (p. 156) shows very high incidence rates of malaria in European servicemen in various parts of East Africa during the war, reduced as time went on and as control measures became more effective. The vectors were *A. gambiae* and *A. funestus*, and the author thinks that though anopheline control may be very effective in controlling malaria for the greater part of the year, larval control may fail to check the high seasonal incidence caused by *A. gambiae* in the more intensely malarious parts of East Africa. He (p. 36) found powdered Derris root (2 lb. per acre), and Gammexane (4 oz. per acre) effective larvicides, and gives the formula of a satisfactory oil which, at 5 gallons per acre, kills all larvae of *A. gambiae*.

WILSON and ROBERTSON (p. 1039) report on the use of DDT spray from aircraft in suppression of breeding of *A. gambiae* and *A. funestus* in East Africa. At a rate of 32 mgm. per square metre breeding was immediately reduced by 98 per cent.; the radius of control against these species need not be extended, in similar conditions, more than 1½ to 2 miles. The main application of this form of control (which is relatively costly) would be in inaccessible or very extensive areas, or where speed is necessary.

MACINNES (p. 701) shows that larvicidal oils containing DDT have some lethal action on adult *A. gambiae* and *A. funestus* when the latter are kept in cages containing bowls of water covered with such oils.

For control of *A. melas* in the tidal marshes near Freetown, TREDRE (p. 488) excluded tidal water from the belts of *Paspalum* grass and *Avicennia* mangrove, by embankments, drains and sluicegates with tidal flaps. He supplemented these measures by the use of larvicides, and by destruction of adults. For the control of *A. melas* in West Africa, THOMSON (p. 795) thinks that bunding is probably the most effective method, but the siting and construction of the bund are affected by local conditions.

A. sundaicus breeds, south of Calcutta, in association with floating algae or submerged aquatic vegetation, but is inhibited by dense shade such as that given by the water hyacinth *Eichornia speciosa*. IYENGAR (p. 564) has eradicated the larvae from ponds and swamps by cultivating this plant, and thinks that shade may act by killing the algae on which the larvae feed.

In the islands of Guadalcanal and Guam, during the war, dense forest was sprayed with DDT from aircraft, as a means of mosquito control. HURLBUT *et al.* (p. 881) found that doses of 0·4 and 0·2 lb. DDT per acre (in cyclohexanone and mineral oil) reduced adult mosquitoes and larvae by 98 and 99 per cent. respectively.

Although conditions in 1945 favoured the breeding of *A. quadrimaculatus* in the Tennessee Valley, the expected outbreak of malaria did not occur, probably, as WATSON *et al.* (p. 801) suppose, because there were so few gametocyte carriers, owing to malaria control in the past. JONES *et al.* (p. 504) show that the *para-para'* isomer of DDT is about six times as toxic as the *ortho-para'* isomer, to larvae of *A. quadrimaculatus*. BRESCIA (p. 881) has used DDT aerosols for killing larvae of *A. quadrimaculatus*; a dose of 0·001 lb. DDT per acre killed almost 100 per cent. within 12 hours.

DDT, in doses of 15–30 gallons of 5 per cent. oil solution, emulsion or suspension, ensured about 75 per cent. reduction of flies and mosquitoes, for 46 days, in salt marsh or jungle vegetation in the United States. Benzene hexachloride also gave promise of good results (MADDEN *et al.*, p. 1042).

In a comparison of DDT in the form of dust, spray and mist (in oil), and of paris green, MATHIS *et al.* (p. 644) show that the DDT mist was the most generally useful in control of anopheline larvae. FERGUSON *et al.* (p. 645) give detailed information on the production of the DDT-oil mist.

In the Tennessee Valley Authority reservoirs, many plants create problems associated with breeding of *A. quadrimaculatus*. HALL and HESS (p. 1042) have experimented with 2,4-dichlorophenoxyacetic acid for control of growth of these plants, using it as a dust or as a spray. Details of the strengths of mixtures and solutions, and of method of application are given; this substance will probably prove more efficient and economical than mechanical means in the control of terrestrial plants and of most stiff-stemmed annuals, but it may have a deleterious effect on cotton crops in the vicinity, if it reaches them.

DEONIER *et al.* (p. 289) discuss some 6,000 organic compounds tested for toxicity to fourth-instar larvae of *A. quadrimaculatus*.

WESTPHAL and HORTON (p. 565) have successfully used tricalcium arsenite in place of paris green (but in twice the amount) in control of breeding of *A. pseudopunctipennis* in Peru.

Spray-killing of Adult Mosquitoes

UPHOLT (p. 645) discusses the inactivation of DDT in nature, especially its adsorption on mud. HADAWAY and BARLOW (p. 1038) find that only 6–15 per cent. of DDT (in oil) remains on the surface of mud bricks, the rest being adsorbed ; a better result (62 per cent.) is obtained from treatment with a water suspension of dispersible powder.

GORDON (p. 801) did not observe ill effects in men engaged for several months in preparing solutions of DDT in kerosene, and applying them.

RIBBANDS (p. 180) remarks that discovery of an efficient insecticide possessing no residual repellent or masking effect would be a considerable contribution to modern technique, and shows that pyrethrum has a repellent action which lasts for at least 4 days. Lethane gives quicker knock-down than pyrethrum, and is less repellent, but is more unpleasant. From careful experimental work, KENNEDY (p. 561) shows that DDT irritates mosquitoes, causing them to leave a treated surface more quickly than a non-treated surface, though not causing them to avoid the treated surface. In this sense it is a repellent, and the dose the mosquitoes receive may be irritant but not fatal. The work was done with *Aëdes aegypti* and *Anopheles maculipennis atroparvus*.

SWELLENGREBEL (p. 285) discusses malaria in Holland, pointing out that wartime destruction of a large number of domestic animals may force *A. maculipennis messeae* to feed more on man, and therefore perhaps to become a more efficient vector. The most important vector is *A. m. atroparvus*. Spraying of houses with DDT may be a useful measure of control. Experience with pyrethrum spraying during 10 years was satisfactory, even in the epidemic year of 1944 (SWELLENGREBEL and KRAAN, p. 286).

In a flooded area near the mouth of the Volturno River in Italy, AITKEN (p. 800) applied DDT in kerosene to all habitations, in January 1945. Thereafter it was found that the average anopheline density in human and animal houses was enormously reduced until autumn, and was accompanied by great decrease in the numbers of larvae in the swamps. Spleen and parasite rates were reduced. Anophelines were relatively numerous near any untreated shelter, and the author concludes that in such work all buildings should be sprayed. *A. maculipennis labranchiae* and *A. sacharovi* were the predominant species. SOPER *et al.* (p. 877) refer to the work described by AITKEN, and report similar work carried out in the delta of the Tiber, where *A. m. labranchiae* was breeding extensively in the flooded areas. DDT was sprayed in every house or shelter capable of harbouring anophelines, in spring 1945. The number of adults caught until late autumn was very low, compared with previous records. Any unsprayed shelter greatly affected the numbers in the neighbourhood. The incidence of malaria declined continuously from March to the end of the year.

KARTMAN and DA SILVEIRA (p. 38) show that relatively short contact with a DDT film in a glass tube is lethal to *A. gambiae*, but in comment BUSVINE points out that all the DDT would be on the surface of the glass, which is not the case with many other materials.

DE MENDONÇA and CERQUEIRA (p. 965) show that *A. gambiae* continues to be found in aircraft arriving in Brazil from Africa. Inspection and fumigation of arriving aircraft are compulsory because of the danger of this and other pests.

WILSON (p. 179) notes that in partially closed buildings, for spray-killing mosquitoes, the " direct hit " is essential, and the average flit gun is not satisfactory. Against *A. gambiae* and *A. funestus* spraying is necessary every day, in the evening. Pyrethrum is an essential constituent, but some DDT should

be added. THOMSON (p. 795) has demonstrated the important fact that within a few days of treatment of houses, in Lagos, with DDT in kerosene, *A. gambiae* and *A. melas* enter the houses at night, feed, and leave without resting. There was no appreciable mortality within 48 hours in those that left in this way. Dramatic reduction in house catches after treatment with DDT is no proof that mosquitoes of these species are being killed. He discusses malaria in the Africans, and makes the point that it is not known to what extent malaria contributes to the ill-health of West African adults.

HOCKING (p. 879) shows that residual spraying with DDT is effective against *A. gambiae* and *A. funestus* in that it does not interfere with normal entry into a building, but that the mortality in those that have been able to feed, and therefore tend to rest, is very high. He gives details of dosages, and information on the effect of the various surfaces to which DDT was applied. In relation to *A. gambiae* and *A. funestus* in the Gold Coast, EDDEY (p. 879) has found that spraying houses with DDT in kerosene, in various doses, is effective in reducing the numbers found at subsequent examination when counts were made of mosquitoes killed by pyrethrum spray [but see THOMSON above]. He calculates that such treatment would be needed every 2½ months, and notes that this method is more effective than continued spraying with pyrethrum, as was practised previously. In preliminary experiments on house-spraying with DDT against *A. funestus*, VINCKE (p. 286) found that it does not prevent them from feeding, and has no repellent effect. Pyrethrum appears to have some initial repellent action, which gradually diminishes.

Senior WHITE *et al.* (p. 37) have published a critical review of the results attained in India by the spray-killing of adult mosquitoes with pyrethrum preparations; this has been more successful against *A. culicifacies* (which remains indoors, after feeding, until digestion is nearly complete) than against *A. minimus*. For the *A. fluviatilis* group, spraying for 6 days each week is the most effective; these mosquitoes leave the houses when digestion is only half complete, and are therefore vulnerable for spray-killing for only one daylight period in the cycle. Pyrethrum acts as a repellent to mosquitoes entering rooms. On the other hand, VISWANATHAN *et al.* (p. 38) think that for *A. fluviatilis*, spraying for 2 consecutive days followed by an interval of 1 or 2 free days, is satisfactory if antilarval methods are not possible.

In an experiment on control of rural malaria in India, VISWANATHAN and PARIKH (p. 798) conclude that residual DDT spray can be used economically and effectively, that a combination of spray-killing and larvicidal methods is too expensive, and that pyrethrum spray-killing is also too expensive.

Senior WHITE and GHOSH (p. 799) have found DDT residual spray more effective against *A. fluviatilis* than against *A. culicifacies*, probably because the normal resting places of the former are walls and other places likely to have been sprayed, rather than furniture.

In relation to *A. minimus* in Assam, RIBBANDS (p. 1041) found that spraying of houses with emulsions of DDT was more effective than with solutions, and that relatively heavy doses are preferable to light doses in view of their long persistence. Treatment of walls only, or ceilings only, may be effective. If the reduction of anophelines reaches 90 per cent. there is, almost certainly, complete control of malaria transmission, but a repellent effect may be present which may reduce the actual degree of malaria control. Gammexane was also tested, but on a smaller scale; its rôle is not yet established.

BRADLEY and FRITZ (p. 180) show that residual spraying with DDT is very effective against *A. quadrimaculatus*, greatly reducing the number found in houses for as long as 4 months, and also the number found to contain human blood.

FAY *et al.* (p. 562) have tested the persistence of toxic effect of DDT when sprayed on certain surfaces, under experimental conditions. *A. quadrimaculatus* was used in these tests. Residues from 100 mgm. per square foot were unreliable for lasting effectiveness. The same authors (p. 563) show how much the type of surface affects the residual toxicity. A dried mud surface is particularly bad, and grease and smoke deposits reduce the effectiveness of the DDT. TARZWELL and FISK (p. 563) show that in rooms sprayed with DDT, the resting time of *A. quadrimaculatus* was very much shorter than in unsprayed rooms. They suggest that some unengorged mosquitoes may be sufficiently irritated by DDT to leave before feeding. As a result of tests of the effectiveness of DDT spraying of houses and barns, as a measure of control of *A. quadrimaculatus*, HESS and KEENER (p. 880) conclude that treatment of houses alone is inadequate, and that if all premises cannot be sprayed, it is better to treat barns in preference to houses, since this mosquito rests in barns during the daytime more frequently than in houses.

A comprehensive report from Panama on the effect of spraying houses with DDT, on the density of *A. albimanus* and on the incidence of malaria, is given by TRAPIDO (p. 287). The anopheline density is dramatically reduced and remains relatively low for several weeks, and a considerable degree of control may be effected in this way, but spraying 3 months before the period of great anopheline abundance is ineffective in preventing the normal increase. Figures are given which show the reduction effected in the incidence of malaria by this means. *A. albimanus* is a wild mosquito, which seldom remains long in houses. Nevertheless, STEPHENS and PRATT (p. 564) found that spraying of houses in Porto Rico with DDT, twice in one year, produced a significant reduction in the parasite rate of the inhabitants.

GIGLIOLI (pp. 181, 504) has found that *A. darlingi* is particularly vulnerable by DDT ; females rest on the walls of houses before and after feeding. In sprayed houses in British Guiana great reduction in specimens captured in dwellings was observed during 9–10 months after spraying, and there was a significant fall in spleen and parasite rates in the people.

GAHAN and PAYNE (p. 880) show that spraying of villages with DDT not only very greatly reduced the number of adult *A. pseudopunctipennis* for several months, but reduced also the number of larvae found breeding in the adjacent ricefields.

Malaria of Monkeys, Birds, etc.

GARNHAM (p. 882) describes his discovery of exoerythrocytic forms of *P. kochi* in *Cercopithecus* monkeys in Kenya. These bodies were found in the livers of 15 of the monkeys, and the author gives his reasons for considering them to be exoerythrocytic forms of this parasite. [This is the first occasion on which such forms have been described in mammalian plasmodia.]

In the Report of the Scientific Advisory Board of the Indian Research Fund Association for 1946 (p. 966) there is an account of the attempt made in India to find exoerythrocytic forms of *P. cynomolgi* in monkeys. The attempt was not successful, but a lot of information was obtained on mosquito transmission, transmission by injection of sporozoites, and infectivity of blood and various organs at different stages after infection.

WOLFSON and WINTER (p. 565) describe the course of *P. cynomolgi* infection in rhesus monkeys. TALIAFERRO and TALIAFERRO (p. 965) describe the course of asexual reproduction in *P. cynomolgi*.

MAJUMDER and DAS GUPTA (p. 183) describe the blood picture of normal *Macacus rhesus*, and discuss the anaemia produced in them by *P. knowlesi*. MCKEE and his colleagues (p. 1043) have studied the chemistry and metabolism of monkey blood, both normal and infected with *P. knowlesi*, and

describe apparatus in which cultures can be maintained *in vitro*. Sub-cultures have been made for 7 generations, the parasites remaining infective. These papers contain much detail, and the originals should be studied.

SHEN *et al.* (p. 1045) find that red cells containing *P. knowlesi* develop increased osmotic fragility and are destroyed by mechanical trauma more easily than normal cells. This may be the basis of the haemolytic anaemia of malaria.

MCKEE and GEIMAN (p. 649) report work which indicates that the plasma level of ascorbic acid in monkeys infected with *P. knowlesi* is lower than the normal, and also that in monkeys rendered deficient in this vitamin, induced infection is less acute than in normal controls; such monkeys appear able to acquire immunity and control the infections.

RICHARDSON *et al.* (p. 289) have investigated the course of *P. knowlesi* infection of monkeys after measured infections, and have assessed quantitatively the great superiority of sulphadiazine over quinine in treatment.

EKZEMPLARSKAYA (p. 182) shows that monkeys infected with *P. inui* become immune to the same strain, but not to other strains of the same parasite. He also shows that the humoral factor in the defence mechanism is insignificant in comparison with the cellular factor.

PEEL and RODHAIN (p. 967) describe the schizogony of *P. reichenowi* in a chimpanzee. RODHAIN and LASSMAN (p. 184) discuss the cultivation of the malaria parasites of chimpanzees, by the method of Bass. RODHAIN (p. 801) describes a new malaria parasite of the gibbon.

WOLFSON and CAKRTOVA (p. 566) discuss the relationship between the number of parasites and infected red cells in bird and monkey malaria.

STAUBER and WALKER (pp. 967, 1046) describe a method of preparing suspensions of avian malaria parasites almost entirely free of any trace of red cell substance.

SEELER and OTT (p. 185) discuss the effect of deficiencies in vitamins and protein on avian malaria.

DEARBORN and MARSHALL (p. 568) find that various species of avian malaria parasites differ in their response to different drugs, and that a single species, therefore, is not satisfactory for the purpose of selecting drugs for test. MARSHALL and DEARBORN (p. 292) show that in avian malaria a single daily dose of a drug may give results worse than, equal to, or better than those obtained by continuous drug-diet administration, according to the drug used.

TREMBLEY (p. 402) has shown that *Aëdes atropalpus* is a potential vector of *P. gallinaceum*. HOVANITZ (p. 566) shows that there is little variation in infectibility of individual *Aëdes aegypti* with *P. gallinaceum*. CANTRELL and JORDAN (p. 39) show that the maximum number of oöcysts occurs in *Aëdes aegypti* when these mosquitoes feed on chickens infected with *P. gallinaceum* the day before the peak of parasitaemia; they discuss the possible reasons for this.

GORDON and HILL (p. 402) describe their technique for obtaining suspensions of infective sporozoites of *P. gallinaceum*, which are bacteriologically sterile, from the salivary glands of mosquitoes.

TERZIAN (p. 969) shows that splenectomy during the latent period adversely affects chicks infected with *P. gallinaceum*, though not those with the milder *P. lophurae* infection. This indicates that the lymphoid-macrophage system is actively involved in these infections.

CEITHAML and EVANS (p. 567) exposed red cells containing *P. gallinaceum* to X-ray, and then injected them into clean fowls. High doses of X-ray reduce the infectivity of the parasitized cells, partially or entirely, but injection of these cells confers some immunity, as tested by subsequent injection of infective blood.

TALIAFERRO and TALIAFERRO (p. 40) report that chickens infected with *P. gallinaceum* show strong immunity to the same species and to *P. lophurae*, but that chickens infected with *P. lophurae* show only slight immunity to *P. gallinaceum*.

DOWNS (p. 1045) shows that single trophozoites (*P. gallinaceum*), injected into normal chicks, give rise to schizogonous, gametogonous and exoerythrocytic cycles.

TULLIS (p. 968) describes the distribution of exoerythrocytic forms of *P. gallinaceum* in chicks, after blood infection. HAAS *et al.* (p. 290) describe their methods in obtaining heavy exoerythrocytic infections of chicks with *P. gallinaceum* ; for details the original should be consulted.

BRACKETT *et al.* (p. 291) have shown that infections with *P. gallinaceum* in chickens taking a diet deficient in pantothenic acid are much less severe than in controls, and that pantothenic acid is necessary for the erythrocytic stages of this parasite. The exoerythrocytic forms probably find enough pantothenic acid in their particular habitat. Analogues of this substance have an antimalarial action in blood-induced, but not in sporozoite-induced, infections, and this is antagonized by pantothenate.

ZUCKERMAN (p. 504) has studied infections of chick embryos with *P. gallinaceum*, induced by implantation of emulsions of brain containing exoerythrocytic and erythrocytic stages on to the chorio-allantoic membrane, and by intramuscular injection of blood containing erythrocytic forms. It seems that infection through the membrane is effected only by the exoerythrocytic forms. Parasites in embryonic spleen can be grown by a tissue-culture method, and by exposing such spleens, containing exoerythrocytic forms, to various drugs, and then making tissue cultures, the effects of the drugs can be estimated.

MEYER (p. 968) has cultivated the erythrocytic form of *P. gallinaceum* in tissue cultures of embryonic chicken brain.

TONKIN (p. 184) tested a number of drugs against exoerythrocytic forms of *P. gallinaceum* in tissue culture ; for details the original should be consulted.

BRACKETT *et al.* (p. 40) describe the antimalarial effects of metachloridine against *P. gallinaceum* and in human malaria. It can act as a causal prophylactic against *P. gallinaceum* and is effective against *P. cathemerium* (HUGHES and BRACKETT, p. 41).

CARLSON *et al.* (p. 39) have found that extracts of various plants are not only effective bactericidal agents, but also are lethal to *P. gallinaceum in vitro*.

GINGRICH *et al.* (p. 803) obtained radical cure of *P. cathemerium* infections with a naphthoquinone derivative.

BALL (p. 1045) has attempted to cultivate the mid-gut of *Culex tarsalis*, containing oöcysts of *P. relictum*, but although the stomach remained alive for 10 days, the oöcysts did not develop.

COULSTON and HUFF (p. 970) describe the morphology of pre-erythrocytic forms of *P. relictum*. HAWKING (p. 970) has grown exoerythrocytic forms of *P. relictum* in tissue culture.

TRAGER (p. 1046) used a complicated medium for the cultivation of *P. lophurae*. True multiplication of the parasite occurs, and physiological studies are therefore possible.

HUFF *et al.* (p. 1046) have studied pre-erythrocytic forms of *P. lophurae* in turkeys, ducks, chickens and guinea-fowl. They conclude that it is no longer possible to measure susceptibility of the host solely by the degree of parasitaemia, since some parasites exhibit numerous pre-erythrocytic forms, but only a mild blood infection. They give four criteria by which the suitability of a host for a given parasite may be measured.

RIGDON and VARNADOE (p. 505) show that malarious ducks live longer in an oxygen chamber than in air, and they discuss the administration of oxygen in human malaria. ROSTORFER and MCGEE (p. 567) have studied the arterial oxygen saturation of ducks infected with *P. lophurae*; the findings cannot satisfactorily be condensed further. RIGDON and ROSTORFER (p. 883) have shown that death of birds infected with *P. lophurae* is caused by failure of the blood to carry sufficient oxygen to support life; at the time of death it may have only 20 per cent. of the normal oxygen capacity. FLETCHER and RIGDON (p. 42) observed neurological disturbances (ataxia, etc.) in ducks which had recovered from *P. lophurae* infections, and think that these may have been due to anoxia, the result of anaemia, aggravated by vasomotor instability. RIGDON (p. 884) shows that deficiency of vitamin A does not significantly affect this disease, and RIGDON and MARVIN (p. 884) that insulin injections do not affect it. SEELER and OTT (p. 41) show that *P. lophurae* infection in chickens on low-protein diet runs a much more severe course than in those on high-protein diet, even if total serum protein is normal. It is known that hypoproteinaemia interferes with antibody production.

ROOS *et al.* (p. 403) have investigated the different effects of deficiency of various vitamins on *P. lophurae* infection of chickens and ducks.

MARSHALL and DEARBORN (p. 292) have shown that in ducks infected with *P. lophurae*, and treated with mepacrine, similar plasma concentrations produced in individual birds by different doses are not equally active against the infection. Great variations were found in different birds given the same dose, and these are probably due to differences in distribution between plasma and tissues (including erythrocytes).

WOLFSON (p. 568) shows that *P. elongatum* attacks immature erythrocytes of ducks, and is a very fatal infection in spite of relatively low rates of parasitaemia. *P. lophurae*, on the other hand, attacks mature red cells, produces severe parasitaemia, but not so severe anaemia.

MANWELL (p. 43) describes certain malaria parasites of bats.

THOMPSON (p. 43) shows that the action of quinine on the malaria parasites of lizards is similar to its action on the plasmodia of various warm-blooded animals. THOMPSON (p. 569) has observed the effects of mepacrine on the lizard malaria parasite, *P. floridense*. *Charles Wilcocks*

RABIES

LÉPINE, P. & ATHANASIU, P. Contamination spontanée du lapin par le virus de la maladie de Borna. [**Spontaneous Infection of a Rabbit with Borna Disease.**] *Ann. Inst. Pasteur.* 1947, Aug., v. 73, No. 8, 827–8.

This note records the fate of one of a batch of 8 rabbits which had been used to titrate rabies virus by inoculation of brain substance from a rabbit unquestionably infected with rabies. The titres employed were not lethal to 7 of the rabbits: the eighth died, but histological examination demonstrated beyond doubt that the animal exhibited the lesions, not of rabies, but of Borna disease: the latter disease could be reproduced experimentally in fresh rabbits. The source and mode of the infection is discussed and it seems to be likely that it was derived from another rabbit, known to have Borna disease, which had

occupied the same cage as the rabbit under discussion which was subsequently inoculated with rabies virus.

The practical importance of this observation is that, as the authors were working on a strain of rabies virus having " a slow evolution " the symptoms found in a rabbit eventually proved to have Borna disease might easily have passed for those of rabies—and the real diagnosis might have remained unrecognized—had not a strict histological control of all the animals' brains been in operation. *H. J. O'D. Burke-Gaffney*

LEVADITI, C., VAISMAN, A. & DUNOYER, M. Potentiel proliératif et négrigenèse d'une souche de virus rabique des rues (Tanger C). [**Proliferative and Negrigenic Power of a Strain of Rabies Street Virus (Tangier C).**] *Bull. Acad. Nat. Méd.* 1947, v. 131, Nos. 30/31, 593–6.

The authors describe their experiments with the Tangier C strain of street virus obtained in 1946 by REMLINGER and BAILLY from a rabid cat.

As a result of experiments on mice, it was found that this particular strain produced great numbers of very large, clearly staining, Negri bodies ; moreover it was the most Negrigenic strain in the authors' experience. There was, however, no difference in the time of appearance of Negri bodies in the usual sites between this strain and the strains of TIV and of fixed virus used for comparison.

The Negrigenic power of the Tangier C virus did not appear to be attenuated after repeated mouse passage, although such passage showed that the virus, by a progressive shortening of incubation period from 13 to about 6 days after its ninth passage, had a tendency to become fixed.

Control experiments proved that proliferation of the Tangier C virus in the neural axis was more rapid than that of either TIV or fixed virus, until the third day when the concentration of virus in the brain was found to be equal for all three viruses. The study of two street viruses demonstrated that multiplication of virus occurred in the brain before the appearance of Negri bodies in the cytoplasm.

The authors conclude that the Tangier C strain of rabies virus is exceptional in its Negrigenic power and in its marked and rapid proliferation in the neural axis. *G. Stuart*

KOPELOFF, Lenore M. & KOPELOFF, N. **Neurologic Manifestations in Laboratory Animals produced by Organ (Adjuvant) Emulsions.** *J. Immunology.* 1947, Nov., v. 57, No. 3, 229–37. [15 refs.] [Summary appears also in *Bulletin of Hygiene.*]

A number of authors have described paralytic manifestations and lesions in the central nervous system of monkeys, induced by the repeated injections of brain suspensions: the use of " adjuvants " greatly accelerates the development of these changes. In the present work, the effect of injecting various organ suspensions has been investigated. The " adjuvants " used were a lanolin base (Falba), paraffin oil, and dried *Myco. tuberculosis* suspensions [see also *Bulletin of Hygiene*, 1945, v. 20, 585, 772 ; 1946, v. 21, 646]. Guineapigs injected subcutaneously with a single dose of brain emulsion developed, after 2–5 weeks, mild paresis of a leg or paralysis of both legs, usually proving fatal. This effect was induced by homologous or heterologous whole brain with " adjuvants ". Rabies vaccine (phenolized rabbit brain) and uninfected rabbit brain proved effective in producing these phenomena. *A. J. Rhodes*

LÉPINE, P. & ATHANASIU, P. Evolution des lesions histologiques et des anticorps rabicides aux cours de l'incubation de la rage des rues. [**Development of Histological Lesions and of Rabicidal Antibodies during the Incubation Period of Street Virus Rabies.**] *Ann. Inst. Pasteur.* 1947, Aug., v. 73, No. 8, 824–7.

The time when the first histological lesions appear during the incubation period of rabies is of much theoretical and practical importance. Could it be demonstrated that the first lesions in the brain occur before the saliva becomes virulent, it would be possible to exempt from treatment persons bitten by an animal showing no symptoms of rabies and dead before the expiration of its period of observation. Of theoretical interest would be the establishment of a relationship, should such exist, between the occurrence of cellular lesions and that of serum antibodies.

To settle these questions, the authors inoculated 14 rabbits by the intracerebral route with a street virus strain (Corsican strain I), of which the full development in the rabbit regularly exceeds 18 days and averages 20. From the 48th hour after inoculation, the authors killed one rabbit every second day, then from the 16th to the 20th day one rabbit every day. The brain, the two Gasserian ganglia and 1·5 cm. of the main trunk of the sciatic nerve were removed from each animal for histological examination, and parts were inoculated into mice for proof of the presence of virus. Moreover, before being killed, the animal was bled and its serum titrated with suspensions of the same street virus strain to determine the existence of neutralizing antibodies.

From these experiments it emerged that, after the intracerebral inoculation of rabbits with the particular street virus strain employed, the first lesions in the brain appeared about the 4th day, while the brain became virulent only on the 8th day and death did not supervene until the 18th day *at the earliest.* The Gasserian ganglia showed lesions on the 8th day and gave evidence of virulence on the 10th. In the sciatic nerve, lesions were demonstrable on the 10th day, virulence was present on the 12th ; but, whereas virus remained in the brain up to the moment of death, there was observed in the Gasserian ganglia and in the sciatic nerve a diminution, indeed a total disappearance, of virulence from the 18th day.

Antibodies, which first made their appearance in the serum on the 10th day, thereafter showed a regular increase up to the time of the animal's death, when a very high content was achieved. *G. Stuart*

JACOTOT, H. Le gel d'alumine comme adjuvant du vaccin antirabique formolé. [**Alumina Gel as Adjuvant to Formolized Antirabic Vaccine.**] *Ann. Inst. Pasteur.* 1947, Oct., v. 73, No. 10, 1028–30.

The author had previously placed on record the 10-to-25-fold increase in immunizing power conferred by the addition of aluminium hydroxide to anti-cattle-plague vaccines made from formolized organic pulp. A similar procedure permits a reinforcement of the formolized antirabic vaccine in current use in many countries for prophylaxis against canine rabies.

The technique of preparation is briefly as follows : dogs are inoculated with fixed virus rabies by the intracranial route ; when they are completely paralysed, they are killed and their brains extracted ; the infected brains, after being finely ground in a mortar, are emulsified with a little formolized water ; after filtration through gauze, the emulsion is placed in an incubator for 24 hours at 37°C. ; thereafter it is kept for 4 days at the temperature of the environment (25°–30°C.). The emulsion is then divided equally ; to one part is added an amount of alumina gel equal to or somewhat less than the mass of nervous

matter ; finally sufficient water is added to ensure a resulting dilution of 1 : 5. The remaining half is brought to the same volume with plain water and serves as the control vaccine.

Five sets of adequately controlled experiments were made, during which guineapigs in parallel series had been inoculated with a twice-repeated dosage, at three weeks' intervals, of from 0·25 cc. to 2·0 cc. of either gel or non-gel vaccine ; this had been kept at room temperature before use for periods ranging from 15 days to 7 months, at the end of which time a test dose of 0·02 gm. of street virus was administered in the masseters 3 to 5 weeks after completion of treatment.

It was found that vaccine, with gel added, protected 81 per cent. of the relevant guineapig series, while the control vaccine protected only 44 per cent. ; and that the test dose, which killed all the unvaccinated control animals, killed 3 times as many guineapigs protected by the ordinary formolized vaccine as those treated with gel-added vaccine. The author therefore concludes that the alumina gel clearly reinforces the protective power of antirabic vaccines prepared from formolized emulsions of brain pulp.

Finally it should be noted that in the case of the vaccine concerned, the action of the alumina gel is on a tissue pulp rendered wholly avirulent by the addition of formol. *G. Stuart*

GHODSSI, M. Dix années de traitement antirabique à l'Institut Pasteur de l'Iran (Téhéran) 1936–1945. [**Ten Years of Anti-Rabies Treatment at the Pasteur Institute of Iran (Teheran) 1936–1945.**] *Ann. Inst. Pasteur.* 1947, Sept., v. 73, No. 9, 900–902.

The author intimates that there was a change during 1936 in the method of anti-rabies treatment practised at Teheran ; from vaccination with dried cords to the use of 5 per cent. fixed virus rabbit brain, in 1 per cent. phenolized water, killed by exposure to 37°C. in the incubator for 24 hours.

The usual course of treatment is the daily administration subcutaneously in the abdomen of 6 cc. on 20 successive days, but in the case of severe wounding (multiple bites on the face) the daily injections are extended to 30 days.

No decentralization of treatment is possible.

During the 10 years of treatment with phenolized vaccine, there have been 38 deaths ; most of these occurred at the beginning, middle or end of treatment, some few one or two days after its completion. Of these deaths, 36 followed wolf bites, 1 was from dog bite and 1 from jackal bite. In all 38 cases there was considerable delay in reporting for treatment—a delay averaging 15 days from the time of biting (minimum 5 days, maximum 32 days).

During the 10 years under review, no case of neuroparalytic accident was observed among the 2,135 bitten persons treated. *G. Stuart*

REMLINGER, P. & BAILLY, J. La rage du loup, critérium de l'efficacité de la vaccination pasteurienne. [**Rabies in the Wolf ; Criterion of Efficacy in Pasteurian Treatment.**] *Bull. Acad. Nat. Méd.* 1947, v. 131, Nos. 30/31, 597–9.

The authors recall recent criticism regarding the efficacy of anti-rabies treatment by Pasteur's method. In their view, definite proof of efficacy would be furnished by a statistical study of the results of treatment in cases of wolf bite. They point out that wolves are almost certainly rabid if they bite human beings and that the incubation period of rabies after bites by these animals is shorter than that for other animals. In the past, there have been many instances of death in those actually under treatment.

The suggestion is made that in cases of severe wolf-bite the intensive method of treatment advocated by FERRAN should be adopted. The basis of this treatment rests on the assumption that the addition of bichloride of mercury to an emulsion of fixed virus gives a chemotactic effect to the inoculated material which results in the retention in the peripheral circulation of leucocytes, which otherwise might transport a quantity of virus by the blood stream to the central nervous system.

The authors further suggest increased doses at diminished intervals, compared with the dosage and interspacing followed in the classical treatment ; they add that with killed virus vaccine the paralytic accidents previously encountered with massive dosage need not now be feared. *G. Stuart*

PUBLIC HEALTH REP. Wash. 1947, Aug. 22, v. 62, No. 34, 1215–37. [30 refs.] **Control of Rabies.** Report by the Committee on Public Health Relations of the New York Academy of Medicine.

The control of rabies in the United States has been studied and reported on by the Committee on Public Health Relations of the New York Academy of Medicine. Although the report under review is but an abridgement of the full Report, nevertheless the shorter version contains so much of value to those interested in rabies control that no abstract could hope to do justice to the many aspects of the problem treated. The reader is advised, therefore, to obtain and study the original document.

In the following review only the more important points receive consideration :—

Between 1938 and 1945, the average annual incidence of reported rabies in animals in the U.S.A. was 8,775, with the last three years of the series above average. 1945 was the peak year. Notifications, however, are regarded as incomplete. Rabies occurred mainly among dogs, but many other animal species were affected. An epizootic among foxes has troubled the south-eastern States for some years.

One of the major difficulties in securing effective control over the disease is the lack of uniformity between States and counties within States of notification procedures and control measures. Thus in some States, rabies in animals is not even notifiable and the laws regarding the licensing and vaccination of dogs follow no common pattern. A similar diversity exists in the laws regarding quarantine and the inter-State movement of animals. This lack of legislative uniformity is reflected in the innumerable agencies charged with the enforcement of such control laws as exist. SCHOENING in the Yearbook of Agriculture for 1942 adequately sums up the existing situation : " Rabies is an outstanding example of a dangerous disease, which could be controlled or eventually eradicated in the U.S.A., but which is not under control because of failure to impose and thoroughly carry out uniform regulations".

Intensive investigations made by JOHNSON in Alabama between 1936 and 1945 yielded interesting findings, including the demonstration of a high degree of immunity in dogs after a single inoculation of 5 cc. of a phenolized vaccine containing 20 per cent. brain tissue. The immunity thus induced was reported as satisfactory for one year. Seventy-five per cent. of inoculated dogs maintained a high level of antibody in the serum for six months after protection, but this percentage fell to 44 at the end of one year. But resistance to infection was reported even in those dogs which after a year had no appreciable amount of virus-neutralizing substance in the blood serum.

Although " preventive vaccination of dogs is practicable, but cannot be relied upon as the sole means of controlling the disease ", much confidence is reposed in the vaccination of animals, and a single subcutaneous inoculation of

5 cc. of potent vaccine is recommended for dogs, when rabies has been reported in the area. Three injections, administered at weekly intervals, are, however, regarded as producing a more certain immunity. This latter method was practised yearly by the U.S. Army during the Second World War and only one case of rabies developed among 19,050 dogs so immunized. In the case referred to, it is possible that the routine vaccination had not been carried out.

The common line of control measures in the presence of established cases in various States has been: mass vaccination of dogs, free of charge to the owners; enforcement of quarantine laws; collection and disposal of stray dogs; and appropriate education of the general public.

The Report also includes a review of recent scientific developments, including the mouse inoculation test devised by WEBSTER & DAWSON in 1935 [this *Bulletin*, 1935, v. 32, 608]. This method is stated to give 10 per cent. of positive results in cases where Negri bodies had not previously been demonstrated. Stress is also laid upon the superior potency of vaccine irradiated with a new type of extreme ultra-violet lamp, described by LEVINSON *et al.* in 1944 [*ibid.*, 1944, v. 41, 914], as compared with phenol- or chloroform-treated vaccines or with vaccine irradiated by ordinary ultra-violet light. Protection by this special irradiated vaccine has been given against 20,000 M.L.D., compared with 2,477 M.L.D. for a control phenolized vaccine. Potency is said to be good after storage, no appreciable loss being detected after six months.

Reference is again made to the suggestion of HABEL [*ibid.*, 1946, v. 43, 192] that the use of immune serum, alone or in combination with vaccine given after a period of 6 days, may effectively protect man against rabies.

Finally, a series of recommendations by the Committee is submitted, urging the adoption of National control measures. The Federal agencies concerned, in co-operation with appropriate State agencies, should draw up a plan for the eradication of rabies. The inter-State transportation of susceptible animals should be regulated and provision made for the control of animals entering the United States from foreign countries. Rabies should be made universally reportable. The annual licensing and vaccination of dogs is recommended, with the suggestion that in urban areas the granting of licences should be contingent on vaccination. Three injections of 5 cc. of a potent vaccine at weekly intervals are recommended as constituting the method of choice, but a "single shot" injection of 5 cc. is of benefit when mass vaccination programmes are being carried out and triple inoculation is not practicable. Recommendations to promote control also include the quarantine and impounding of dogs during outbreaks. Educational campaigns should also be launched, giving publicity to the measures adopted. *G. Stuart*

IONESCU, D. Importanta vaccinatiunii antirabice, preventive şi obligatorie in massa a cainilor, in profilaxia turbarii. [**The Importance of Mass Vaccination of Dogs in the Prevention of Rabies.**] *Rev. Ştiinţelor Med.* Bucharest. 1946, May–Aug., v. 35, Nos. 5/8, 424–30. French summary.

A wild strain of rabies virus obtained from a wolf was adapted to dogs by serial passage. At the present time the strain has undergone more than 300 passages, and the incubation period has become stabilized at 7 days. A phenolized vaccine has been prepared from the strain, and is considered to be more effective in immunizing dogs than one utilizing a strain of virus adapted to some other mammalian species. The use of the vaccine is devoid of risk, and it is suitable for the mass vaccination of dogs, which is considered to be a rational and practical method for reducing the incidence of rabies. Experience of mass inoculation in other countries is briefly reviewed.

D. J. Bauer

NOVICKY, R. Aportación al estudio de la rabia paralitica bovina en Venezuela. [**Bovine Paralytic Rabies in Venezuela.**] *Bol. Inst. Invest. Vet.* Caracas. 1946, Dec., v. 3, No. 13, 399–468. [35 refs.] English summary.

MALARIA

DE MEILLON, B. **The Anophelini of the Ethiopian Geographical Region.** *Publications of South African Inst. Med. Res.* 1947, Sept., v. 10, No. 49, 272 pp., 85 pls., 1 map & 2 figs. Johannesburg: The Librarian, South African Institute for Medical Research, Hospital Street. [30*s*.]

Students of African anophelines will welcome the appearance of this work, as it brings together available knowledge and an up-to-date classification of these mosquitoes. The book is intended for those who already have some knowledge of the subject; therefore there is no general account of mosquito morphology. Nearly a hundred species and varieties of *Anopheles* are dealt with; they occur in the continent of Africa south of the Sahara, the islands around it and a small portion of Arabia. Classification is based largely on the works of Root, Christophers, Edwards and Evans, with some modifications. Adult characters are used principally for the identification of subgenera and groups, and larval characters for the identification of series. Subgroups have been abandoned in favour of series in order to maintain uniformity.

Phylogeny, zoogeography and the relationship of the species to malaria are briefly discussed, and breeding places are broadly classified. Keys are provided for the separation of subgenera, groups and series; there are also keys to females and to fourth stage larvae. The keys to pupae and to eggs are for the moment tentative as they will need revision as more precise information is accumulated.

The main bulk of the book (some 200 pages) is taken up with systematic descriptions of the species, though these are limited to the bare essentials. The chief distinguishing morphological features of most of the species are illustrated by numerous line drawings. Descriptions of pupae are not included in this section, as there is considerable doubt about the accuracy of some of the published descriptions. For each species there are notes on breeding places, relation to malaria and on distribution. At the end of the book there is a summary of the known geographical distribution of the species in tabular form, a valuable bibliography occupying eight pages and a most clearly arranged index.

The true value of a book of this nature can only be assessed after a period of use and reference, but there is no doubt that this publication is most timely. Both the morphological and the biological details have been most carefully assembled; and from the frequent notes which follow many of the descriptions, one gains the impression that the author has been to considerable pains to include ideas and results from the latest investigations. The general matter is of necessity somewhat condensed but in view of the extensive bibliography provided, not unreasonably so. For example, the important species *Anopheles gambiae* and *A. funestus* receive fourteen and eight pages respectively, but in each case only two pages are taken up with morphology, the remainder being devoted to biological matters; other species of less medical importance are quite adequately dealt with in a page or two. Some species are of course not yet so thoroughly known, but as knowledge increases it becomes evident that previously accepted ideas about species relationships and species distribution must be modified. To take one point, cited by the author, *A. brunnipes*, a

species formerly known only from Angola and the Belgian Congo and recently shown to be a vector of malaria, is now recorded from Portuguese East Africa and the Rhodesias.

Modern methods of study, including the rearing of species through all stages from the egg to the adult, comparison of certain morphological characters such as the female pharyngeal armature, male terminalia and pupal paddles, have provided the worker with further clues to these relationships and have all combined to assist in the accurate identification of these important insects. For some time to come this book will be regarded as a major reference work on the subject of African anophelines. *H. S. Leeson*

SCHWETZ, J. Recherches sur les moustiques dans la bordure orientale du Congo Belge (Lac Kivu–Lac Albert). [**Studies of Mosquitoes in the Eastern Border of the Belgian Congo.**] *Institut Royal Colonial Belge. Section des Sciences Naturelles et Médicales. Mémoires.* (Collection in–8°.) 1944, v. 14, No. 1, 93 pp., 8 maps (1 folding) & 9 figs. on 2 pls. [11 refs.]

The author collected 68 species of mosquitoes (15 Anophelines, 1 Megarhine and 52 Culicines) during a journey along the eastern border of the Belgian Congo between July and November 1939 ; this period covered part of the dry season and part of the wet season, and the country investigated ranged from south of Lake Kivu to the north of Lake Albert.

This publication contains annotated records of the collection arranged by localities, which are briefly described. There are sketch maps of some of the areas, as well as a map of the whole region showing the route followed. The substance of the paper is mainly entomological and is not easily summarized ; those interested would in any case have to consult it in the original. The collections are deposited partly in the Museum of the Belgian Congo at Tervueren, Belgium, partly in the British Museum (Natural History) and partly in the Laboratory of Parasitology of the University of Brussels.

H. S. Leeson

KALANDADZE, L. P. & KAVILADZE, O. P. [**On the Blood-Sucking Mosquitoes of the Western Part of the Iran Azerbaijan.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1947, v. 16, No. 1, 57–65, 5 figs. [In Russian.]

With the view to filling the gap in our knowledge of the mosquito fauna of the Azerbaijan province of Iran, the authors have made collections and observations in the course of two years, the results of which are described in this paper. Mosquitoes in this area are represented by the following forms : (1) *Anopheles maculipennis* is ubiquitous ; of the two subspecies present, *A. m. maculipennis* is widely distributed, while *A. sacharovi* has a restricted distribution. This species is the most dangerous local vector of malaria. (2) *A. claviger* (*bifurcatus*) was found in Khoi and Maraga. (3) *A. algeriensis* which is a rare species, occurs in Maku. (4) *A. plumbeus* was seen once in Khoi. (5) *A.* (*Myzomyia*) *superpictus* is widespread, being second only to *A. maculipennis*. (6) *Theobaldia* (*Allotheobaldia*) *longiareolata* is comparatively rare ; it was encountered in Khoi, Maku and Sharef-Khana. (7) *T. alaskaensis* is rare, probably restricted to mountainous regions ; found in Maku. (8) *T. annulata* is the most common species of this genus, occurring in Khoi, Maku, Shahpur, Rizaeh. (9) *T. annulata subochrea* was found only in Khoi. (10) *Aëdes* (*Ochlerotatus*) *caspius caspius* occurs in Khoi, Shahpur, Maku, Beshkez and Tabriz. (11) *A.* (*O.*) *c. dorsalis* is first recorded for Iran ; it occurs in Khoi, Shahpur, Maku, Tabriz and Sharef-Khana. (12) *A.* (*Aëdimorphus*) *vexans* is found in Beshkez and Khoi. (13) *Culex* (*Neoculex*) *deserticola* : One specimen only seen in Maku, but its identity

needs confirmation. (14) *C.* (*N.*) *hortensis* a very rare species encountered in Karavan-Sarai and Maku. (15) *C. theileri* is fairly widespread; found in Khoi, Maraga, Maku and Karavan-Sarai. (16) *C. pipiens*, though known to be common, relatively few specimens were collected in Maku, Rizaeh, Ushna, and Maraga. Among the malaria vectors the most common and dangerous species are *Anopheles maculipennis maculipennis* and *A. superpictus*, while the most common culicines are *Aëdes caspius*, *Culex theileri* and *C. pipiens*.

The authors further give some phenological data on the anophelines of Iranian Azerbaijan, *viz.*, time of flight after hibernation; time of appearance of first aquatic stages; flight of first males and number of generations; preparation for hibernation. It is noted that all water collections play an important rôle in the distribution of the malaria vectors, but especially those which are connected with the irrigation system. Anopheline mosquitoes were encountered in dwellings of different types, including dug-outs and tents, as well as in barns and cellars, but they were especially numerous in animal-houses. Though the buildings do not provide the mosquitoes with shelter during the malarious season, they congregate there in large numbers for hibernation.

C. A. Hoare

BEKLEMISCHEV, W. N. & SHIPITSINA, N. K. [*Anopheles marteri* **in the North-Western Iran.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1947, v. 16, No. 1, 66–7, 3 figs. [In Russian.]

The authors record the first finding of *Anopheles marteri* in the valley of the river Yuzbashchai of north-western Iran. It is noted that although the distribution of this species covers all the Mediterranean region from Spain and Algeria to Thrace and Syria, and extends to the mountains of Middle Asia, it has hitherto not been discovered between Syria and Tadjikistan. The present finding helps to fill the gap and leads one to expect to find this species in Southern Transcaucasia, including the mountains of Southern Azerbaijan [Iran] and Armenia. A description is given of the characters of the larvae of this mosquito.

C. A. Hoare

WOODHILL, A. R. **Observations on the Morphology and Biology of the Subspecies of** *Anopheles punctulatus* **Dönitz.** *Proc. Linnean Soc. New South Wales.* 1945, v. 70, Pts. 5/6, Nos. 321/322, 276–87, 1 map and 3 figs.

This paper is a further contribution to the discussion on the relationship and status of the forms of the Australasian anopheline mosquito occurring within the species *Anopheles punctulatus*.

The author holds that there are two subspecies (not species) *A. p. punctulatus* and *A. p. farauti* which may be differentiated morphologically by the palps in the adult and by the shoulder hairs in the larva. Certain other differences in larvae are not constant over the whole range of the species, but only in certain areas.

Besides these two subspecies, intermediate forms exist which the author believes to be hybrids; and this idea is supported by evidence produced from field observations; for where one subspecies is present alone no intermediates have been recorded, whereas breeding experiments show that both adult and larval progeny of intermediate females exhibit all variations from the *A. p. punctulatus* to the *A. p. farauti* type.

It is essential that workers should attempt to cross one subspecies with the other on a large scale and demonstrate finally whether inter-fertility occurs.

With reference to *A. koliensis*, which appears to be constant in its characters in the Solomon Islands, specimens from New Guinea cannot be considered as

such, because they give rise to both *punctulatus* and *farauti* in their progeny; the author is therefore of the opinion that it is more logical to regard *koliensis* as a subspecies of *punctulatus* than as a distinct species. *H. S. Leeson*

HARDMAN, N. F. **Studies on Imported Malarias. 3. Laboratory Rearing of Western Anophelines.** *J. National Malaria Soc.* 1947, Sept., v. 6, No. 3, 165-72.

This paper concerns the insectary rearing of *Anopheles maculipennis freeborni* in California and includes some notes on *A. m. occidentalis*, *A. punctipennis* and *A. pseudopunctipennis franciscanus*.

The insectary was a dull-white painted room of 1,050 cubic feet, provided with natural as well as fluorescent lighting. The temperature was about 28°C. and the relative humidity was between 80 and 95 per cent. Larvae were kept in shallow rectangular pans in water from the breeding place and only one batch of larvae was reared in the same water. The larval food was a mixture of 90 per cent. finely ground dog-food with 10 per cent. yeast. This mixture was dusted on to the water surface daily from the second or third day after the hatching of the eggs. Pupae were recovered daily and transferred to cartons, into which two or three large larvae were placed to consume the surface scum; this procedure reduced the previously very high mortality among emerging adults to about 4 per cent. All pipettes were rinsed in alcohol between moves, to prevent the contamination by bacterial scum being transmitted from one pan to another.

In seven months, 89,500 pupae were obtained and seven generations were passed through. The period from oviposition to pupation averaged 21 days over a range of 12 to 30 days at a water temperature of 27°C. Adults reared from larvae kept at 100 to 200 per square foot of water surface were smaller than field-collected adults, but those reared from larvae kept at 10 per square foot were about the same size.

Attempts to rear *A. m. occidentalis* and *A. punctipennis* have so far failed. A few attempts to obtain mating of *A. pseudopunctipennis franciscanus* were successful, but only in cages 14×14×36 inches or larger. It was found necessary to give blood-feeds to females of *franciscanus* at least once before insemination occurred and no females were found inseminated until all traces of the blood meal were gone from the midgut. (In *A. m. freeborni*, no relation could be found between blood-feeding of females and insemination.) Another point of interest mentioned is that both *boydi* and *franciscanus* types of eggs were produced from a single first generation, laboratory-reared, female *A. p. franciscanus*.

Four tables compare the rate of development of different generations of *freeborni*, the percentages of pupae obtained, the differences between field-collected and reared batches of mosquitoes and the hatchability of eggs of the various generations. *H. S. Leeson*

BATES, M. **The Laboratory Colonization of** *Anopheles darlingi*. *J. National Malaria Soc.* 1947, Sept., v. 6, No. 3, 155–8.

When attempting to establish laboratory colonies of mosquitoes, techniques may have to be varied for different species, and though the author of this paper is not satisfied that he has discovered the most satisfactory methods of handling *Anopheles darlingi*, he gives an outline of his present procedure, because it has served to maintain the colony for three months in his laboratory in Colombia.

For the culture medium, experience showed that best results were achieved with stream water and surface loam, with bread crumbs as larval food. To induce females to feed and mate, no special lighting arrangements had to be made and it was found that as a source of blood a calf was more convenient and satisfactory than either man or the other animals tried. For egg-laying females, dark dishes were more attractive than white ones, and the most suitable cage size was 2 metres high by 1·5 metres square, or larger.

A. strodei and *A. argyritarsis* were also successfully reared under the same conditions as *A. darlingi*, but attempts to rear *A. rangeli* and *A. pessoai* failed.

H. S. Leeson

GIGLIOLI, G. **Laboratory Colony of** *Anopheles darlingi*. *J. National Malaria Soc.* 1947, Sept., v. 6, No. 3, 159–64, 1 fig.

In British Guiana, after an attempt to establish a laboratory colony of *Anopheles darlingi* had failed at the sixth generation, a second attempt was made and resulted in a colony which has now flourished uninterruptedly for over two years, and which by December, 1946, had passed through 35 generations.

Three cylindrical netting cages (60 cm. high and 35 cm. in diameter) have been found to be sufficient and more satisfactory than the usual wood, wire and glass cages. White china finger-bowls and larger white enamel basins are used for the aquatic stages. It was soon found that the selection of water was extremely important, the best results being obtained from clean, fresh water with a *p*H of 6 or 7 ; the local artesian well water was excellent. For the females, feeds of human blood were offered every morning between 8 and 10 o'clock ; no animals were used at all. Larval food consisted of a proprietary poultry mash, either plain or mixed with yeast. As the laboratory is situated among irrigated fields of cane and rice (the natural habitat of *A. darlingi*), no special arrangement had to be made to create suitable climatic conditions indoors ; the only precautions necessary were to see that the colony was protected from draughts and excessive light. A table gives the average monthly temperatures and relative humidities in the laboratory ; a temperature of 80°F. and a relative humidity of 85 per cent. may be regarded as optimal. A second table summarizes the duration of the periods of development for each stage from egg to adult for different seasons throughout thirty generations. There are, of course, certain extreme deviations ; but apart from these there is a general tendency for certain values to recur irrespective of season. First ovipositions occur usually 6 to 8 days after emergence ; eggs hatch in two days ; the larval stage lasts 6 to 16 days and the pupal stage two days. The complete cycle can be accomplished in from 10 to 14 days. [Regarding the rearing of *Aëdes aegypti*, see JOHNSON, below.]

H. S. Leeson

ALBERTO ALVARADO, C. & HEREDIA, R. L. Observaciones sobre una nueva variedad del *Anopheles* (*A.*) *pseudopunctipennis*, Theobald 1901, encontrada en la provincia de Tucumán. (Nota previa.) [**A New Variety of** *Anopheles pseudopunctipennis* **in Tucumán.**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1947, Nov., v. 2, No. 1, 73–8, 6 figs.

The English summary appended to the paper is as follows :—

" Using the morphological characteristics of the eggs as a basis, the authors describe a new variety of *A.* (*A.*) *pseudopunctipennis* which they designate *patersoni*."

VILLALOBOS C., E. & VALDERRAMA DELGADO, A. El *Anopheles punctimacula* en el Perú. [*A. punctimacula* **in Peru.**] 12 pp. Lima, Dir. gen. Salub., Serv. nac. antimalar. 1944. [Summary taken from *Rev. Applied Entom.* Ser. B. 1947, Dec., v. 35, Pt. 12, 204.]

Although *Anopheles punctimacula*, D. & K., had apparently not been recorded from Peru prior to 1942, it is now common in the district of Lima and is increasing. It constituted 80 per cent. of the Anophelines taken in buildings in two localities in April–July, 1944. Numerous breeding places occur in the coastal area, and in addition to the shaded and sometimes polluted water in which the larvae usually occur, they have frequently been observed in still, clear, sunny water, together with those of *A. pseudopunctipennis*, Theo. The importance of *A. punctimacula* as a vector of malaria has not been definitely established, but in the course of the authors' investigations, although dissection of about 1,000 females gave negative results, four of 135 taken in a house inhabited by two chronic malaria patients situated at a place some 13 miles from Lima, and two of 93 taken at a place 18 miles from Lima, showed sporozoites in the salivary glands. *A. pseudopunctipennis* is still considered to be the main vector, however.

VON DESCHWANDEN, J. Zur Frage der Wirkung des Hochgebirgsklimas beim Malariker. [**On the Effect of Mountainous Climates on Malaria Patients.**] *Acta Tropica.* Basle. 1947, v. 4, No. 4, 335–8.

The favourable effects of mountainous climates on malaria patients have not been satisfactorily explained, says the author. By some it is ascribed to the general sense of well-being and consequent resistance to disease ; by others to increase in red corpuscles and raising of the haemoglobin. Several other hypotheses have been put forward, such as changes in the fat and lipoid ferments and vitamin A content of the serum. It is thought that a study of the reticulo-endothelial stage of the parasite may throw light on the subject.

On the other hand, malaria relapses are relatively common at mountain heights, especially when there is a moist wind blowing. Further, the endothelium is a tissue which readily responds to climatic changes and these reactions are rapidly set up when debilitated or sick persons reside at a height where moist south-west winds prevail.

The author suggests the following : The plasmodia under climatic influence do not enter the erythrocytes but remain, perhaps for months, in the endothelium. At the same time, the climate at high levels acting on the readily responding endothelium, causes a flooding of the parasites into the blood-stream and so renders them more readily vulnerable to therapeutic measures. It is possible that in the endothelium, especially the reticulo-endothelium, at high levels, certain changes of a colloidal, histiochemical, histiophysiological or other nature might play a part in preventing penetration of the plasmodia into the corpuscles, or in the development of endothelial forms. This solution of the question, it is stated, can at present only be suggested, as research on it is completely wanting. [Not a very satisfying contribution and purely hypothetical.] *H. Harold Scott*

INVERNIZZI, G. Osservazioni ematologiche e mielografiche della malaria. [**Haematology and the Myelogram in Malaria.**] *Riv. di Malariologia.* 1947, Oct., v. 26, No. 5, 234–47. [28 refs.]

The English summary appended to the paper is as follows :—

" The author carried out haematological investigation on 230 malaria patients. The method of haemochromocytometric examinations and myelograms by sternal puncture was used and he reached the following conclusions :

"1. In acute malaria the actual anaemia is not so severe as it appears from the clinical symptoms. The erythroblastic report [? findings] is scarce, and some myelocytes are found.

"2. In chronic splenomegalic malarial infection leucopenia with monocytosis is observed. During the stage of acute infection, with shivers, a moderate leucocytosis (7,500–8,000) was seen, with neutrocytosis (70–80%) and a reduction in eosinophiles. As the temperature falls leucopenia returns (3,500–5,000) with neutropenia, mononucleosis and lymphocytosis. Mononucleosis and deviation of the Arneth count to the left are constant.

"3. The parasitic report [? findings] of the bone-marrow was scarce in the myelograms and no erythrocytic forms were seen, but a strong erythroblastic activity was noted with inversion of the leuco-erythroblastic relation and increase of cellular mitosis. No megaloblastic transformation of the bone-marrow was observed, but increase of hytioid [? histioid] elements and a leucoblastic hyperactivity was noted."

VAN DER KUYP, E. De pols-en ademhalingsfrequentie bij malaria. [**The Pulse and Respiration Rates in Malaria.**] Reprinted from *Nederl. Tijdschr. v. Geneesk.* 1947, Mar. 29, v. 91, No. 13, 735–9. English summary.

The author studied the relation between temperature, pulse and respiration in several patients suffering from the three main forms of malaria : 130 of them suffered from quartan infections, mostly of a chronic type.

Although the three factors sometimes corresponded sufficiently with the type of infection, the pulse and respiration curves appeared to be more sensitive indications than the temperature of the progress of the disease during treatment, since they became normal later than it ; a prolongation of their abnormality is stated to have heralded relapses and even the initial attack could sometimes be anticipated by their variations. Hourly readings made these observations more pronounced.

It is suggested that as a result of "schizogony on a small scale," the amount of toxin released is too small to influence the temperature, but that the pulse and respiration are more sensitive to those toxins.

H. J. O'D. Burke-Gaffney

CALEY, F. E. de W. **Clinical Impressions of Malaria and Liver Damage.** [Correspondence.] *Lancet.* 1947, Dec. 20, 926–7.

The paper by MAEGRAITH, ANDREWS and GALL [see this *Bulletin*, 1948, v. 45, 234] reminds the author of cases of malaria with liver damage seen by him in Siam. He states that 400 men, being prisoners of war, were working on the Mergin road from May to August, 1945. Of these 100 died, and half of them died in an unusual manner. The illness began with continuous fever of about 102°F. After 5 days, hiccup began and the patients became deeply jaundiced. After four more days, they became comatose, with stertorous breathing suggestive of hepatic failure and with hiccup after every few respirations. Three days later death occurred. Vomiting was present but was not severe, while complete anorexia occurred. There was no tendency to haematuria or general haemorrhage. The urine was scanty and coloured by bile pigment. There was some enlargement of the spleen and liver. Later, some of the patients were evacuated to Nakon Paton. The author heard that the blood slides showed *Plasmodium falciparum.* It is suggested that these cases were due to a hepatotoxic strain of this parasite. They did not resemble bilious remittent fever, which was not encountered. At another camp in Siam, there was a higher incidence of cerebral malaria than elsewhere. It seemed possible that the strain of *P. falciparum* was of an encephalopathic type. Blackwater fever

was sporadic in incidence ; one in four of the patients died. Treatment was by intravenous mepacrine. Where dysentery occurred with malaria, it was the interaction of two diseases. No cases of choleraic, algid, cardiac or purpuric type were seen. Three cases were seen which resembled acute haemolytic anaemia with air-hunger, and a lemon-yellow skin and conjunctivae, without haemoglobinuria. *C. M. Wenyon*

HERNBERG, C. A. **Malaria Tertiana and Renal Injury.** *Acta Med. Scandinavica.* 1947, Sept. 22, v. 128, No. 6, 590–95. [12 refs.]

This paper contains a short account of four cases of malignant tertian malaria occurring in Finland, showing signs of renal disturbance. In three, the renal damage was of the character of focal nephritis. The kidney syndromes in all cases were relieved by antimalarial treatment. A short note is given of the literature on the subject of renal damage in malaria, especially damage to the tubular epithelium in malignant tertian, evidenced by dilution of urine, diminution in output and rise of blood non-protein nitrogen. The four cases referred to in the text are the only cases with renal symptoms in 1,500 cases reported over the years 1941–45. *B. G. Maegraith*

BENHAMOU, E., ALBOU, A., ZERMATI, M. & EISENBETH, R. Hémorragie méningée au cours d'un paludisme à *Plasmodium vivax*. Considérations pathogéniques. [**Haemorrhagic Meningitis during** *Plasmodium vivax* **Malaria.**] *Algérie Méd.* 1947, Oct., v. 50, No. 8, 611–14.

Haemorrhagic manifestations appear to be rare in malaria : the authors quote SHRAGER and KEAN [this *Bulletin*, 1947, v. 44, 170] who met only 10 cases of purpura in 10,000 consecutive cases of malaria treated in Panama ; none of the published cases noted by these authors included meningeal lesions.

The present case refers to an Algerian who complained of persistent headaches for five days, accompanied by vertigo. Although he had a history of trauma on two occasions (one involving the neck, seven years earlier) these accidents were not serious and could not be regarded as relevant to the present condition. For nine months, the patient had felt weak and experienced fever of a malarial type almost daily : he noticed a swelling of the abdomen and an intermittent discomfort in the left hypochondrium.

On examination, he looked thin, with pale conjunctivae : the spleen was considerably enlarged, but painless. Lumbar puncture produced a reddish fluid, which did not coagulate on standing and which showed no micro-organisms on direct examination. Two blood films, taken after an interval of 3 days, showed the presence of *Plasmodium vivax*. Haematological examinations revealed a normocytic, normochromic anaemia, with 2,360,000 red corpuscles per cmm. and 5·1 per cent. reticulocytes : cold agglutinins were present at a titre of 1/32.

The bleeding and coagulation times and the platelet count were as follows :—

	1st day	9th day	29th day	36th day
Bleeding time	15′	3′ 30″	3′	4′ 45″
Coagulation time	8′	4′	12′	8′
Platelet count	44,000	77,000	100,000	133,000

The haemorrhagic and meningeal syndromes both responded to quinine ; and the cerebrospinal fluid was normal on the 30th day.

The authors refer to the literature of purpura in malaria [see this *Bulletin*, 1938, v. 35, 728] and quote cases in which haemorrhages in different organs had been noted : but none of these included the meninges, nor were they related to any one species of *Plasmodium* only.

In Shrager and Kean's cases [and in that recently reported by MAMOU [this *Bulletin*, 1948, v. 45, 237] the purpura followed on administration of quinine in 9 of the 10 cases : in the present case, no such treatment had been given before the onset of the haemorrhagic condition.

In discussing the pathogeneses of the condition, the authors quote BENHAMOU and NOUCHI (*C. R. Assoc. française pour l'avancement des Sciences Algér.* 1930, May), as having shown a significant decrease in platelets in malaria : they also refer to a thesis, published in Algiers by ASSUS in 1945, which suggests that haemorrhagic manifestations are not uncommon in patients having a raised titre of cold agglutinins. The authors therefore conclude by posing the question : What complementary rôle may auto-agglutinins play in the appearance of haemorrhages during malaria ? *H. J. O'D. Burke-Gaffney*

WINCKEL, C. W. F. **Quinine and Congenital Injuries of Ear and Eye of the Foetus.** *J. Trop. Med. & Hyg.* 1948, Jan., v. 51, No. 1, 2–7, 3 maps. [13 refs.]

It is well known that temporary deafness or blindness may occur as a result of quinine intoxication.

The author draws attention to 15 instances of congenital deafness and two of congenital blindness described in the literature as occurring in cases where the mother has taken quinine in pregnancy or just before labour. All these cases were noted in the United States of America, and the amount of quinine taken varied from quite small to large doses. In one instance, the mother had been given 90 grains daily, by mouth and injection, for 7 weeks during pregnancy ; the child was deaf for 6 months after birth, but ultimately recovered and at the end of 17 months hearing was perfectly normal. [As the author remarks it is a wonder, if this statement is true, that the patient survived.] It was found that the auditory and visual defects were not influenced by the amount of quinine taken.

The cases described are very few, only 17 appearing in the literature and all from the United States, yet the world consumption of quinine is estimated at from 600,000 to 800,000 kilogrammes yearly. If quinine is an important cause of congenital deafness or visual defects, cases would surely have been met with and reported more frequently and from all malarious parts of the world. Further, there is no correlation between the endemic incidence of malaria in the various States and the proportion of their inhabitants who are deaf mute or blind. This is clearly shown in 3 maps which give (*a*) the endemic malarious areas in various States, (*b*) the ratio of deaf mutes, (*c*) the ratio of blind persons in various States.

It is of interest to note that several series of such congenital auditory and visual defects have been described in instances where the mother has suffered from rubella in pregnancy [see *Bulletin of Hygiene*, 1947, v. 22, 172, 390].

[The reviewer has attended several hundred confinements in malarious districts among the non-indigenous population, most of whom had taken quinine at some time during pregnancy. In only one case was a case of deaf-mutism seen, the mother, a European, having taken 5 grains of quinine daily during almost the whole of pregnancy. The child subsequently turned out to be mentally defective and it is not thought that quinine can be blamed for the condition. It would be interesting to know whether a daily prophylactic dose of quinine taken over the course of years predisposes to deafness.]

C. F. Shelton

PLOYÉ, M. Quelques aspects de la question des Totaquinas. [**Some Aspects of the Totaquina Question.**] *Rev. Paludisme et Méd. Trop.* 1948, Jan. 15, v. 6, No. 44, 1–17. [Refs. in footnotes.]

MACHELLA, T. E., KIMMELMAN, L. J. & LEWIS, R. A. **The Intravenous Administration of Atabrine in Falciparum Malaria.** *Bull. U.S. Army Med. Dept.* 1947, Dec., v. 7, No. 12, 1009–21.

Many authorities regard the intravenous use of atabrine [mepacrine] as dangerous. This paper is the result of observations on 125 Chinese soldiers treated in Burma during the active malaria season (June–October 1944) and a series of experiments was planned to learn how this drug could be given most safely by the intravenous route.

No attempt was made to select cases but those with severe cerebral symptoms received the larger doses. All cases in this series had positive blood films.

The degree of parasitaemia was graded as follows: (1) rare to few; (2) moderate; (3) many; (4) loaded.

The following schedules were used:—

Intravenous atabrine: 0·4 to 1 gm. of the dihydrochloride was dissolved in distilled water (0·2 gm. in 10 c c.) and this solution was added to 1,000 cc. of normal saline and given by intravenous drip, over a period of 3–4 hours.

Quinine: the dihydrochloride (1·2 to 2 gm.) was dissolved in 30 to 50 cc. of distilled water and the solution was added to 1,000 cc. of normal saline and given by intravenous drip.

S.N. 6911 bisulphate (a 4-amino quinoline derivative): 0·64 gm. was dissolved in 1,000 cc. of normal saline and given by intravenous drip.

Atabrine by mouth: 0·2 gm. of the dihydrochloride was given every six hours for five doses and then 0·1 gm. thrice daily for six days.

Daily thick blood films were examined until two negative smears were obtained.

The results of treatment may be summarized as follows:—

1. Atabrine by mouth (2·8 gm. in 7 days): 20 cases. The average duration of fever after beginning treatment was 45·6 hours. Blood films were negative on an average 3 days after beginning treatment. All cases responded to treatment and there were no toxic reactions.

2. Quinine (1·2 gm. intravenously): 10 cases. The average duration of fever was 45·6 hours in the cases where the attack was terminated by the single injection, and blood films were negative after 3·2 days. No toxic reactions were experienced, but in five patients the single injection failed to terminate the attack and additional antimalarial therapy had to be given. [The nature of the further treatment is not mentioned.] A single infusion of 2 gm. given to 3 patients produced alarming collapse and was discontinued.

3. Atabrine (0·4 gm. intravenously): 10 cases. The average duration of fever was 21·8 hours. Blood was negative after 2·3 days. No toxic reactions were observed, but in one case this treatment did not stop the attack.

4. Atabrine (0·6 gm. intravenously): 20 cases. Average duration of fever 29·1 hours, negative smear after 2·3 days. No toxic results followed and all cases responded.

5. Atabrine (0·8 gm. intravenously): 20 cases. Average duration of fever, 24·2 hours, films negative after 2 days. All responded to treatment and there were no toxic reactions.

6. Atabrine (1·0 gm. intravenously): 25 cases. Average duration of fever, 31·6 hours. Blood negative after 2·2 days. All cases responded, but in two instances mental symptoms of a temporary nature occurred, namely excitement, exhilaration, and in one case a short generalized convulsion. Through an error, the first of these patients had received his injection in 50 minutes.

7. S.N. 6911 (0·64 gm. intravenously) : 20 cases. Average duration of fever 41 hours, blood negative in 2·5 days. No toxic signs were noted and all reacted to the dose given.

Eight of the 125 patients showed severe cerebral signs with coma, four of these being treated with 0·8 gm. and four with 1·0 gm. of atabrine intravenously, all with success. No mention is made of the cerebral conditions in the remaining cases. It may be noted that in half the cases so treated, a single infusion of intravenous quinine failed to control the attack. Three cases of *P. vivax* infections were treated with 2·0 gm. quinine intravenously, all three showing severe collapse shortly after the injection.

Serum atabrine concentrations were determined by a field method [see this *Bulletin*, 1945, v. 42, 443].

A factor which appeared to determine the serum atabrine level was the rate at which the injection was given ; for a given dose a higher concentration was found when the injection was given rapidly. The concentration tended to be highest at the end of the injection, varying from 200 to 540 microgrammes per litre except in one case where a concentration of 1,100 μgm. was found without detectable toxic symptoms. After cessation of treatment the amount steadily decreased to an average of 20 μgm. per litre on the 5th day, although small amounts were found as late as the 3rd week.

The authors conclude that :—

1. Intravenous atabrine in dilute solution, *i.e.*, in 1,000 cc. of normal saline, is well tolerated, and amounts up to 1·0 gm. can be given safely.

2. The drug should be administered by the drip method over a period of 3 to 4 hours.

3. Toxic manifestations are negligible where proper precautions are taken.

There were no deaths in this series.

The authors emphasize the fact that they do not suggest that intravenous injection of this drug should be generally adopted as a routine treatment.

C. F. Shelton

RAO, A. R. G. **A Case of Maniacal Excitement following Large Doses of Atebrin.** *Indian Med. Gaz.* 1947, Aug., v. 82, No. 8, 479–80.

MACKERRAS, M. J. & ERCOLE, Q. N. **Observations on the Action of Paludrine on Malarial Parasites.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Dec., v. 41, No. 3, 365–76, 1 coloured pl. & 1 graph.

The changes which the sexual and asexual forms of human malarial parasites undergo during the development cycle in man have been carefully observed in stained blood films of the untreated host and at various intervals after administration of paludrine. The development of the parasites in the mosquito has also been studied. Some of the observed facts have been briefly reported by FAIRLEY [this *Bulletin*, 1947, v. 44, 282]. In the case of *P. vivax* it was found that the drug exerts its lethal action on the dividing nucleus of early schizonts and that growth occurs normally up to this point. Gametocytes are not visibly affected. Fertilization occurs in the mosquito stomach, but cysts fail to mature and the mosquito gut infection becomes sterilized. Gametocytes of *P. falciparum* likewise developed normally in blood, and reached the stage of encystment in the mosquito gut, but further development was inhibited and the infection in this case was also sterilized if a sufficient amount of drug had been present in the host blood. Gametocytes which survived some 12 days after treatment of the host was discontinued, developed normally in mosquitoes ; traces of paludrine in the blood, sufficient at 10 days to affect development, had apparently disappeared by the 12th day. In the case of *P. malariae* the action

of the drug was on young schizonts, but the parasite appeared to be more resistant than *P. vivax*. There is an excellent coloured plate depicting the changes brought about by paludrine on the asexual forms of the latter parasite.

J. D. Fulton

SEN, A. **Treatment of Malaria with the New Synthetic Drug "Paludrine".** *Calcutta Med. J.* 1947, July, v. 44, No. 7, 170–74.

A report of 7 cases, with successful clinical results.

KIKER, C. C. & MORRIS, P. **Aerial Mapping in Malaria Control.** *J. National Malaria Soc.* 1947, Dec., v. 6, No. 4, 219–26, 6 figs.

JOHNSON, C. G. & WALTON, W. H. **The Effect of Area Dosage, Solution Concentration and Drop Size of Sprayed Solutions and Emulsions of DDT against Mosquito Larvae.** *Bull. Entom. Res.* 1947, Dec., v. 38, Pt. 3, 405–30, 15 figs. & 4 pls.

This account describes war-time experiments on a strip of mosquito-infested canal in Surrey about 1,100 yds. long and 40 ft. wide. The mosquitoes were mainly *Anopheles maculipennis* (*messeae*) with a few *A. claviger*. The canal was a disused section with no water flow: the centre carried patches of floating vegetation and the margins were fairly densely grown with reeds. Sections 20 ft. long and *at least* 40 ft. apart were chosen for the experimental areas. The applications were made by an ingenious machine which distributed the spray drops from a rapidly spinning disc; this was moved backwards and forwards across the canal on a wire, thus treating the water in strips. The droplet size could be altered by varying the disc size and the rate of delivery was controlled by varying the liquid feed on to the centre of the disc. For uniform distribution, an eccentric "disc" with a spiral edge was most satisfactory. Estimation of results was made by regular dipping at intervals and at different distances from the bank all along one side of the canal. These dippings were made for several days before and for about a month after spraying.

The first experiment was made to determine the minimum lethal dose of DDT in an emulsion at 0·5 per cent. with droplets about 0·4 mm. diameter. The emulsion "AMSO" was made up from the following concentrate: 30 gm. pure DDT, 400 ml. pool 3 oil, 200 ml. Amoa A5X (an emulsifier, mainly sodium oleate and cresol).

The second experiment was designed to compare DDT in oil (5 per cent. solution aided by solvent naphtha as an auxiliary solvent and oleic acid as a spreader) with the emulsion used in the first test.

The third experiment was to test the effects of droplet size.

The fourth experiment investigated the effects of dilution on oil solutions containing the same amounts of DDT per unit area.

Results:—

1. The critical density of application appeared to be about 40 gm. DDT per acre (10 mgm. per sq. metre). Doses above this were not economically more efficient and doses below gave unreliable results, especially in water among reeds.

2. The oil solution gave results definitely superior to the emulsion, especially among the reeds at the edges of the canal.

3. The finer droplets tended to be blown away from the experimental plots and thereby these tests were handicapped. But where due allowance was made for this by estimating the quantities actually falling on the water, there was no difference in efficiency between drops of 0·4 mm. diameter and of 1 mm. diameter.

4. Dilution of 4·3 per cent. DDT in oil ten times (*i.e.*, 0·43 per cent.) gave almost the same, or slightly inferior, results where the actual quantity of DDT delivered to the water surface was kept constant. *J. R. Busvine*

KUCHER, S. S. **Testing Insecticidal Properties of the Preparation "Insectol" on Mosquitoes.** *Vrachebnoye delo.* 1946, No. 5, 245–6. [Summary taken from *Amer. Rev. Soviet Med.* 1947, Dec.–1948, Jan., v. 5, No. 1, p. 70. Signed Otto HOKE.]

"Insectol is a complex mixture of aromatic carbohydrates and sulphonaphtolic acids. The basic material for its production is the light medium coal tar oil, which is obtained as a by-product in rectification of coal tar. Mixed with water, in which it is highly soluble, it forms a milky emulsion. Its insecticide effect on *Anopheles maculipennis* was tested in laboratory experiments with 3, 4, 5, 10 and 20 per cent. solutions. It was found that 40 cc. of a 10 per cent. emulsion, sprayed on one square meter of a floor or wall of a barn, killed 98 per cent. of the mosquitoes within one hour. The same result was obtained with 20 cc. of a 20 per cent. emulsion. While these results applied to spraying in the open, the toxicity of insectol was found to be far higher when used in stalls and chicken pens. It was proved that insectol acted upon the mosquitoes by mere contact.

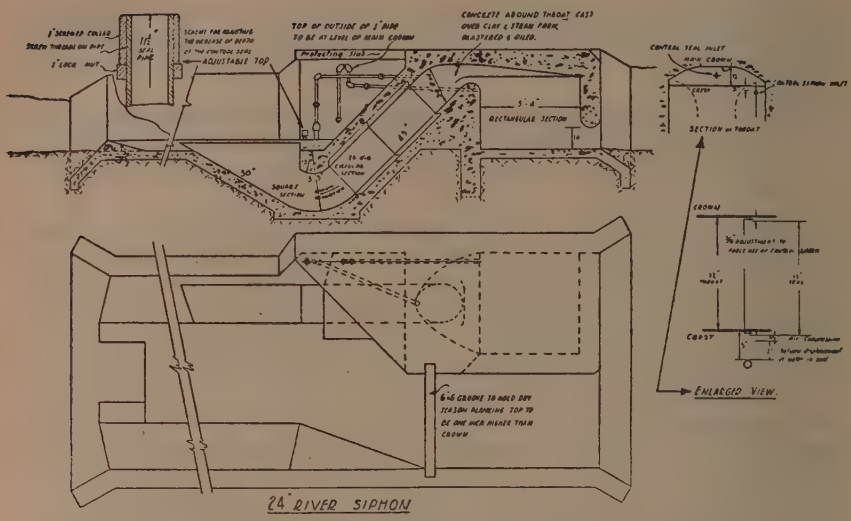
"For practical use 15 per cent. emulsions are manufactured. The spraying of walls outside and inside buildings with 30 cc. of this emulsion per square meter yields satisfactory results. For tightly closed rooms a 10 per cent. emulsion suffices. The odor from spraying with the preparation evaporates after ventilation for five to six days. The unpleasant odor prohibits the use of insectol in human habitations."

PEREDO REYES, E. El cultivo del arroz y sus relaciones con el paludismo en el Estado de Morelos. [**Rice-growing and its relation to Malaria in the State of Morelos.**] *Rev. Soc. Mex. Hist. Nat.* 1945, v. 6, Nos. 3/4, 161–78, 4 pls. & 3 graphs.

NEWBOLD, C. E. & COCHRANE, E. **Automatic Siphons for Antimalarial Control of Tropical Streams.** *J. National Malaria Soc.* 1947, Sept., v. 6, No. 3, 192–205, 4 figs. & 3 charts.

Mechanical fluctuation and turbulence of streams in the wet season in the West Indies is believed to be responsible for the absence of the coastal anopheline, *Anopheles aquasalis*, which usually invades such streams in the dry season from the brackish coastal swamps.

A steady flow of water throughout the dry season permits the use of automatic siphons to produce the necessary flushing and turbulence. The authors consider that control of anopheline breeding is effected by damage to and stranding of eggs. Various types of siphons had been constructed previously without completely satisfactory control of breeding because of technical inefficiency of the automatic siphons. As a result of experience gained, a siphon (deep seal) of 24-inch diameter was built with simple but carefully designed automatic control devices; the best materials and workmanship were necessary to obtain a well-constructed supply reservoir with siphon in order to minimize maintenance costs, labour being expensive in Trinidad. For this particular siphon, a catchment area of 1,000 acres in the dry season enabled sufficient water to be impounded to produce an average discharge for ten minutes at the rate of 20 cubic feet per second, or about 70,000 gallons of water. The six-foot-wide stream was raised 17 inches at 2,000 feet, 13 inches at 6,000



Working design for a 24-inch siphon for the control of mosquito breeding in tropical streams.

[Reproduced from the *Journal of the National Malaria Society*.]

feet and 4 inches at 10,650 feet downstream ; the wave took 80 minutes to reach the last point. Complete anopheline control was attained during six months' observation. In comparison, RAMSAY in northern Bengal [this *Bulletin*, 1941, v. 38, 232] considered a total discharge of 50,000 gallons was the minimum amount necessary to control a mile channel (5,280 ft.) 6 to 8 feet wide.

It is not possible to summarize the discussion and constructional detail given in this most useful paper, but the appended " working design " will be helpful to those interested. To promote smoothness of action, the authors have incorporated a 1-inch control siphon and an adjustable top to the control seal. Malaria engineers are strongly recommended to refer to the original paper with its clear diagrams and excellent photographs. *R. Ford Tredre*

STAGE, H. H. & GIGLIOLI, G. **Observations on Mosquito and Malaria Control in the Caribbean Area. Part II. British Guiana.** *Mosquito News.* 1947, June, v. 7, No. 2, 73–6, 2 figs.

The authors are of opinion that there are probably few countries where malaria constitutes a more serious problem than in British Guiana. In a population of 350,000, deaths ascribed to malaria are two per thousand inhabitants per annum ; a much larger number of deaths due to anaemia, nephritis, prematurity and debility in infants are caused indirectly by repeated malaria infections ; dangerous forms of the disease are frequent.

The inhabitants of the alluvial coastal zone, a mixture of Negroes, Chinese, Portuguese and East Indiana, accept malaria as inevitable. Filariasis is also a major problem and yellow fever a permanent potential danger.

The staple crops, rice and sugar cane, are dependent on extensive irrigation systems despite an annual rainfall of 90 inches. Much of the rice and cane fields along the coast are below high tide level and the practice of flooding fields, and the maze of irrigation channels, provide most favourable conditions for

anopheline breeding. There are fifteen anopheline species, mainly zoophilous, the principal exception being *A. darlingi*, which bites man for preference and is found in houses in large numbers before and after biting.

On the coastal zone, *A. darlingi* breeds in large areas of fresh water such as canals and rice and cane fields. In the interior, it prefers the clear water of ponds, lakes and streams. Salinity and acidity of waters limit its distribution.

A. aquasalis and *A. oswaldoi*, which breed in saline waters, do not appear to be efficient vectors of malaria.

The ten years' observation by Giglioli indicate that sea defences, irrigation and associated cultivations, when used without discrimination between agricultural and residential lands, bring about the establishment of *A. darlingi* and subsequently endemic malaria.

Experience has shown that DDT applied as a residual insecticide is most effective against the vectors of malaria, yellow fever and filariasis, namely *A. darlingi*, *Aëdes aegypti* and *Culex fatigans* to the extent that they are " in grave danger of extermination ". The cost is not excessive, amounting to slightly less than one dollar (British Guiana), per 1,000 square feet of surface treated.

R. Ford Tredre

GRAY, H. F. **Mosquito Control Problems in Japan.** *Mosquito News.* 1947, Mar., v. 7, No. 1, 7–11.

Japan is infested with mosquitoes to the extent that people are so inured to insect attack as to be more or less indifferent to their presence.

Ricefields produce the malaria vector, *Anopheles hyrcanus sinensis*, and the presumed and probable vector of Japanese B encephalitis *Culex tritaeniorhynchus*. Cost prevents the use of larvicides ; " intermittent drying in predetermined cycles " and the introduction of larvicidal fish are recommended to the government as effective and inexpensive control measures ; where outbreaks of disease occur these measures may be supplemented by larvicides and residual insecticides.

Water containers produce the vector of dengue, *Aëdes albopictus* and *Aëdes togoi*. Epidemic dengue occurred between 1942 and 1944, an important contributory factor being *Aëdes* breeding in the household concrete water-containers introduced for fire-control purposes. Small containers in cemeteries are also notable breeding places.

In the rural areas and unsewered portions of cities, human excrement is kept for fertilizer purposes in liquid manure tanks ; *Culex pipiens pallens* and *Armigeres obturbans* breed profusely in these and other collections of foul water.

Reasonable reduction in numbers of mosquitoes can be readily attained at very moderate expense. *Anopheles hyrcanus sinensis* has a marked preference for large animals, and is effective as a malaria vector only if it is present in enormous numbers.

Ignorance and indifference on the part of an impoverished population must be overcome by education before mosquito control measures can be effectively applied.

[The co-author of the well-known text book on Mosquito Control methods has given a useful concise account of mosquito infestation in post-war Japan from the point of view of the military forces of occupation.] *R. Ford Tredre*

JOHNSON, H. A. **Practical Laboratory Methods for Quantity Rearing and Handling of** *Aedes aegypti* **Mosquitoes to be infected with** *Plasmodium gallinaceum.* *J. National Malaria Soc.* 1947, Sept., v. 6, No. 3, 173–9, 4 figs.

The methods of rearing *Aëdes aegypti* described in this paper have been developed over a period of two years in connexion with studies of *Plasmodium gallinaceum* in chickens.

The mosquito colonies are kept at about 75°F. and at a relative humidity between 70 and 75 per cent. The cages are made of wire screening on 3-foot cubical frames with a front of glass having a 16-inch square opening fitted with a sleeve. A partially shaved rabbit provides the blood meal and 5 per cent. sugar-water is kept in the cages. Eggs are laid on wet cellulose sponges : these are removed every second day, kept wet for 72 hours and then dried. The dried sponges may be stored for as long as two months to build up a reserve of eggs. After the sponges are immersed, hatching of the eggs is completed in 36 hours and the young larvae are removed to rearing pans and fed on ground Pablum. Pupae develop in 6 to 10 days and the production is about 2,000 per day. Of these, 800 female pupae are picked out for experiment and the remainder returned to the colony. The 800 pupae are placed in bowls (100 to a bowl) under lamp chimneys with bobbinet tops ; 50 to 75 adults usually emerge from each 100 pupae in 1 to 3 days, and the chimneys are then removed to the feeding room. Here they are clamped to platforms over one-inch holes which are closed with two thicknesses of rubber having cross slits through which the insects may be removed with a suction tube. Wet cotton is kept on the bobbinet for three days. Next day a chicken is placed across the bobbinet top and held by a cloth wrapping and rubber bands ; about 50 to 90 per cent. of the mosquitoes feed in half an hour and the gorged females are removed to a fresh chimney on which is a cotton pledget soaked in 5 per cent. sucrose. After 10 days, a few mosquitoes are examined for sporozoites and sporozoite inoculations are usually prepared from the 12th to the 15th day.

Unused females are kept until they die and some have lived for 110 days ; though usually only 25 to 30 per cent. survive after a month.

H. S. Leeson

HAAS, V. H. & AKINS, H. **Transmission of** *Plasmodium gallinaceum* **by** *Anopheles quadrimaculatus*. *J. National Malaria Soc.* 1947, Dec., v. 6, No. 4, 244–5.

Plasmodium gallinaceum has been successfully transmitted by at least 27 species of mosquitoes [belonging to five genera—*Aëdes, Armigeres, Culex, Mansonia* and *Theobaldia*].

These authors report success for the first time with the use of an anopheline mosquito, *A. quadrimaculatus*. The mosquitoes were obtained from a long-established colony and were allowed to bite chicks whose blood contained gametocytes of *P. gallinaceum*. The insects were kept at 74°–76°F. in a relative humidity of 70 per cent. After 10 days, three stomachs out of ten showed oocysts ; after 12 days, eight in 53 were positive. Seven of the latter were heavy infections and exhibited ripe sporozoites—later shown to be infective by inoculation into chicks, one of which developed parasites. On the fourteenth day, the infection was successfully transmitted by biting (1 chick in 3 showing a patent infection), and also in a separate test by inoculation of the triturated mosquitoes in serum saline.

[The authors state that mosquito dissections done in the field should be interpreted with care, because they may represent avian rather than human infections. In many parts of the world, this would be unnecessary, either because the known anopheline vectors are purely domestic in their habits (and thus unlikely to bite the wild birds) or precipitin tests have already proved that their stomach contents do not contain avian blood. In doubtful cases, it is a simple matter to examine the blood in the stomachs of the suspect species and see if it consists of nucleated corpuscles or not.] *P. C. C. Garnham*

BECKMAN, H. **Attempted Infection of the Hen and Man with the Sporozoites of** *Plasmodium cathemerium 3H2. Proc. Soc. Exper. Biol. & Med.* 1947, Nov., v. 66, No. 2, 401–2.

The trials were not successful.

BLACKWATER FEVER

RAOULT, A. Un cas d'anurie prolongée au cours d'une fièvre bilieuse hémoglobinurique. [**A Case of Prolonged Anuria during Blackwater Fever.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1947, v. 4, No. 1, 43–8, 1 folding chart.

BURWELL, E. L., KINNEY, T. D. & FINCH, C. A. **Renal Damage following Intravascular Hemolysis.** *New England J. of Med.* 1947, Oct. 30, v. 237, No. 18, 657–65, 5 figs. [43 refs.]

This paper is essentially a case report on a 29-year old woman admitted to hospital because of anuria, following abortion and subsequent massive intravascular haemolysis. Three months after this episode, the patient died of homologous serum hepatitis. Autopsy afforded a unique opportunity to examine residual anatomical lesions in the kidneys three months after the anuric attack.

The kidneys were of normal size and shape, the capsules stripped readily ; the surfaces were pale brown and firmly granular. The ratio of cortex to medulla was normal. Histologically, there was diffuse sub-capsular scarring with narrow bands extending deep into the medulla. There was some oedema of the interstitial tissue and focal collections of lymphocytes in the scarred areas. Most of the glomeruli were normal in appearance, but in the scarred areas there was some pericapsular scarring. Some of the convoluted and more particularly the collecting tubules, especially those in the outer zone, were dilated and the lining epithelium flattened. A few tubules contained hyaline casts, and sometimes desquamated epithelial cells. According to the authors, the pattern was such as to suggest the destruction of a single nephron or a group of nephrons.

The nature of the haemolytic reaction in this case was not discovered.

There is a discussion on haemoglobinuric nephrosis and its pathogenesis in general. The authors conclude that no one factor is solely responsible. The therapy of haemoglobinuric nephrosis is also discussed in relation to the case described. The authors stress that in the stage of haemoglobinuria and subsequent anuria the maintenance of blood volume and renal blood flow and a controlled fluid intake should be aimed at.

[As a clinical case report, this paper is interesting. It should have been confined to this. There is nothing new in the discussion on haemoglobinuric nephrosis. Reference to a great deal of relevant literature is omitted. For example the statement is made that " immediate alkalinization is indicated in spite of the conflicting experimental evidence regarding its effects." In support of this dogmatic advice, with which the reviewer heartily disagrees, the reader is referred to one paper only, published in 1940. Work subsequent to this has been ignored.]

B. G. Maegraith

TRYPANOSOMIASIS

PELLISSIER, A. Particularités morphologiques des pièces génitales de *Glossina palpalis* Robineau-Desvoidy, de *Glossina palpalis* Rob.-Desv. var *fuscipes* Newstead, et de *Glossina tachinoides* Westwood, en Afrique Equatoriale Française. [**Morphological Features in the Genital Organs of** *G. palpalis, G. palpalis* **var.** *fuscipes* **and** *G. tachinoides* **in French Equatorial Africa.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 9/10, 355–61, 5 figs.

HOLLINS, C. **Streaky Blood Films.** [Correspondence.] *Lancet.* 1947, Dec. 20, 928.

The author refers to a paper by BOVERI *et al.* (*Lancet*, 1947, Dec. 6, 831), in which it is stated that the streakiness in blood films gives a useful clinical indication of the plasma-fibrinogen level, and, in most cases, of the corrected erythrocyte sedimentation rate.

The present author noted that in the blood of Africans with *Tryp. gambiense* infections, the plasma albumin-globulin ratio is usually reversed, there is intense rouleaux formation and the blood sedimentation rate is much increased. With whole citrated blood, the B.S.R. did not change when it was repeated after re-mixing one hour later: if defibrinated blood was used (with or without citrate) the first B.S.R. was only slightly below that of the whole blood, yet on re-mixing after one hour both sedimentation and rouleaux formation had entirely disappeared. These results were obtained alike at blood temperature and at 0°C.

The author found one part of a 10 per cent. solution of suramin to 4 parts of blood to be an excellent anticoagulant, which also inhibits rouleaux formation and sedimentation: it is suggested that these properties might have practical uses in haematology. *H. J. O'D. Burke-Gaffney*

SICÉ, A. L'aspect des maladies tropicales en Suisse. Deux cas de trypanosomiase humaine africaine. [**Two Cases of African Trypanosomiasis contracted in Switzerland.**] *Acta Tropica.* Basle. 1947, v. 4, No. 4, 298–311.

This is a detailed record of two cases of accidental *T. gambiense* infections in laboratory workers at the Swiss Tropical Institute in Basle. The subjects were women aged 27 and 22, respectively, and the infecting strains had been brought to Switzerland from Léopoldville and Brazzaville in 1945. One of them was arsenic-resistant. The earlier history of these strains is not given.

The patients were apparently infected not by accidental inoculation but by contaminating their fingers with infected blood, in the course of transmitting the strains through guineapigs. The onset in the first case was by a sharp attack of fever with headaches, followed by lassitude, insomnia, anorexia, and an eruption of non-infiltrated, non-pruriginous, erythematous spots on the skin of the abdomen. Trypanosomes were found in the blood 3–4 weeks after the onset of fever.

The second patient's illness began also with headaches and fever, lasting about a week, which then subsided for a month, but reappeared with headaches and lassitude. Trypanosomes were found in the blood about two months after the beginning of the illness, by which time an eruption similar to that of the first patient had appeared on the abdomen.

Both patients were treated by combined atoxyl and tartar emetic, followed immediately by suramin. A month after the end of treatment, one of them had a blood-positive relapse. She was then treated for 6 weeks with combined neostibosan and suramin followed by pentamidine. The second patient received

a final 3-week course of combined tryparsamide and tartar emetic. Both patients appeared quite well 3 months and 5 months, respectively, after discharge from hospital, but are, of course, to be kept under further observation. *E. M. Lourie*

TRINQUIER, E. & ARNOULT, H. Premiers résultats obtenus avec la pentamidine dans le traitement de la maladie du sommeil en A.E.F. [**Pentamidine Treatment of Sleeping Sickness in French Equatorial Africa.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 9/10, 388–400.

The first cases of *T. gambiense* sleeping sickness to receive pentamidine in French Equatorial Africa were treated in November 1945.

Experience with this compound has confirmed that of other workers. It is described as one of the best peripheral sterilizing agents known. Early cases can be cured in 10, or perhaps even 5, days. It has given excellent results in the treatment of relapses, or of cases refractory to other compounds. In the late stages, however, it is inadequate, but combined with tryparsamide it gives results at least as good as those given by any other tryparsamide combination. *E. M. Lourie*

SCHUELER, F. W. **The Mechanism of Drug Resistance in Trypanosomes. II. A Method for the Differential Staining of Normal and Drug Resistant Trypanosomes and its possible relation to the Mechanics of Drug Resistance.** *J. Infect. Dis.* 1947, Sept.–Oct., v. 81, No. 2, 139–46, 2 figs. [30 refs.]

The author has compared the staining reactions of normal and of drug-resistant strains of trypanosomes at different hydrogen-ion concentrations.

The trypanosome strains were : (1) Normal *T. equiperdum* ; (2) *T. equiperdum* resistant to mapharside and *p*-arsenosophenylbutyric acid ; (3) Normal *T. hippicum* ; and (4) *T. hippicum* resistant to pentavalent arsenicals.

Two purely basic dyes were used, namely, methylene blue (Gruebler) and toluidine blue O (Conn.). In some cases the trypanosomes were first treated with arsenicals, in order to study the effect of this on subsequent staining. A purely acid dye, bluish eosin (Gruebler) was also used.

The findings were interpreted as indicating that the acquirement of drug-resistance involves a significant shift in the isoelectric points of the trypanosome's proteins, particularly in certain localized portions of the trypanosome cell. *E. M. Lourie*

CULWICK, A. T. & FAIRBAIRN, H. **Polymorphism in *Trypanosoma simiae* and the Morphology of the Metacyclic Forms.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Dec., v. 41, No. 3, 415–18, 1 fig.

The authors describe the results of a biometrical study of the morphology of *Trypanosoma simiae*, the causative organism of acute porcine trypanosomiasis. The strain which was used for this work was originally isolated from the blood of a horse in Tanganyika, then passaged through two sheep into tsetse-flies (*Glossina morsitans*), from which the trypanosomes were transmitted cyclically in *Cercopithecus* monkeys. This study is based on the examination of blood films taken daily from these animals in the course of the infection, which lasted 4–6 days. Attempts to infect goats with this strain failed.

A statistical analysis of the measurements of this strain confirmed the reviewer's description of *T. simiae* [this *Bulletin*, 1936, v. 33, 647 ; 1937, v. 34, 524] and showed that the species was trimorphic, comprising (*a*) long stout forms (*simiae* s.s.), which were predominant ; (*b*) *rodhaini*-like forms ; and (*c*)

congolense-like forms. Since the long stout forms were the only ones dividing by binary fission, they are regarded as heterozygous, while the other two are said to be homozygous, according to the authors' views regarding syngamy in this trypanosome [this *Bulletin*, 1947, v. 44, 649].

Metacyclic trypanosomes (which are depicted) were obtained on slides probed on by infected flies. They are represented by forms with and without a free flagellum, measuring 10–12 μ in length. *T. simiae* was also discovered in the blood of cattle. It is thus present under natural conditions not only in its usual host, the pig, but also in two new hosts—horse and cattle. In view of the superficial resemblance of some forms of *T. simiae* to *T. brucei*, and of others to *T. congolense*, equine and bovine infections with the first-named species are liable to be misinterpreted, unless the morphology of the trypanosomes present is carefully determined. *C. A. Hoare*

PONDÉ, A. de A. with the collaboration of J. L. DE OLIVEIRA & others. A doença de Chagas na Bahia. [**Chagas's Disease in Bahia.**] *Arquivos Univ. Bahia Facul. de Med.* 1946, v. 1, 333–456, 107 figs. on pls. & 2 folding maps. [Refs. in footnotes.] Comments in English.

This monograph is a record of careful work carried out with close attention to detail. Cardiac disease is common in Bahia and the author, who is a Professor of Clinical Medicine, has, with the assistance of several colleagues, examined patients passing through the Cardiology Department of the Santa Isabel Hospital. His method of procedure was to examine those presenting suspicious symptoms: oedema, cyanosis, dyspnoea, palpitation, cardiac enlargement, pleural effusion, ascites, hepatomegaly, cardiac murmurs, praecordial pain, etc., by X-ray, by xenodiagnosis, and by complement fixation, using Davis's antigen. Ten species of *Triatomidae* are found in Bahia, but *P. megistus* seems to be the only important vector. Of 409 nymphs and adults 99 (24·4 per cent.) were found infected with *T. cruzi*. For the xenodiagnostic test, 5–8 nymphs and adults were allowed to feed on the patients for, on an average, 30 minutes. Thereafter they were allowed to feed on chickens and guineapigs and were examined 30–60 days after the infecting feed.

Details are given of 37 cases with a number of cardiographic tracings of each, most of them well reproduced. In 11 out of 33 in which the xenodiagnostic methods were carried out, the results were positive, a figure closely approximating that of ROMAÑA and COSSIO who found 34·6 per cent., whereas DIAS recorded only 14·15 per cent. The complement fixation test, however, gave a positive result in all 33 cases in which it was performed; in the other four, xenodiagnosis was positive and the c.f. test was omitted.

The ages of the patients recorded ranged between 8 and 48 years, the majority being in the third and fourth decades and almost half (17 out of 36 whose ages were known) were between 21 and 30 years. The electro-cardiographic changes varied, the commonest being primary changes of the S-T and T waves and A.V. block.

There is a line map indicating the places whence patients came and where infected *P. megistus* were found and there are the usual photographs of children showing Romaña's sign. *H. Harold Scott*

ROMAÑA, C. & ABALOS, J. *Triatoma delpontei* n. sp. (Hemiptera, Reduviidae). [*Triatoma delpontei*, **n. sp.**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1947, Nov., v. 2, No. 1, 79–93, 7 figs. & 2 coloured pls. [14 refs.]

The English summary appended to the paper is as follows:—

"The authors describe *Triatoma delpontei* n. sp., infected naturally by *Schizotrypanum cruzi*; their differential study is made with *Triatoma platensis*

Neiva 1913. *T. delpontei* has been obtained exclusively in nests of *Miyopsitta monacha cotorra.*"

DE FREITAS, J. L. P. Contribuição para o estudo do diagnóstico da moléstia de Chagas por processos de laboratório. [**Laboratory Methods of Diagnosis of Chagas's Disease.**] [Thesis for Doctor's Degree.] *Universidade de São Paulo, Faculdade de Medicina.* 1947, 160 pp., 2 figs. on 1 pl. [Bibliography.] English summary.

[This thesis is better than the usual run of theses for doctorate in Brazil Universities with which we have become acquainted. It differs much from the usual compilation from the literature for, though references to and quotations from published books and papers are copious, this thesis details a record of a considerable amount of work carefully performed by the author, though, naturally, it is repetitive rather than original.]

The various methods of diagnosing Chagas's disease are taken up in turn; the author has tried them himself in a fairly large number of cases and here puts his findings on record. First, *xenodiagnosis.* This was tested in 550 persons, and 93 (16·9 per cent.) proved positive; of 1,025 Triatomidae which fed on patients suffering from Chagas's disease only 212 (20·6 per cent.) were infected—not a satisfactory result—and one patient was tested no less than 14 times. Of 32 patients specially mentioned as undergoing the test three times, in 17 it was positive on the first occasion, in 9 on the second, and on the third in the remaining six. Second, *animal inoculation,* with the use of guineapigs and rats (camondongos). None of the former (8 only were inoculated) and only 4 of 238 of the latter, inoculated with blood from 38 patients, were infected. Third, *haemoculture* on blood agar was carried out from 21 patients, of whom 12 had given a positive xenodiagnostic test and the other 9 a positive complement fixation. At first, 0·2 cc. of blood was inoculated, but without result, so 0·5 cc. was tried, but again all were negative. Fourth, *complement fixation.* The author divided the cases so tested into groups: (1) Those definitely infected with the trypanosome as evidenced by positive xenodiagnosis, by animal inoculation, or the finding of leishmania forms in the myocardium at autopsy. Of 75 in this group a strongly positive result was obtained in 71 and in two others it was weakly positive, giving 97·3 per cent. positive. (2) Those with lesions, present or healed, of muco-cutaneous leishmaniasis. There were 44 of these and in all cases where the result was positive Chagas's disease was proved to be present also, or was strongly suspected. Where there was no such suspicion the result was negative, as it was also in group 3, syphilitic patients or those suffering from other diseases than Chagas's disease, such as malaria, soft chancre, blastomycosis, lymphogranuloma inguinale, glandular tuberculosis, and infectious mononucleosis. It is true that two patients with chancroid gave a positive c.f. test, but one definitely had Chagas's disease and the other lived in a district heavily infested with Triatomidae. In two among 34 with leprosy, in whom Chagas's disease could be excluded, the c.f. test was nevertheless positive. This test, even when the blood gave a strong positive, proved negative with the spinal fluid.

Other serological tests mentioned are the agglutination reaction, precipitin reactions with culture extracts, and the intradermal reaction with heart extract as reagent, which was negative in all cases tried.

The author concludes: "Xenodiagnosis is the best method to show the presence of *T. cruzi* in the blood of chronic cases of Chagas's disease. However, as in a large number of patients this test may be negative, the complement fixation test, employing *T. cruzi* antigen, is deemed the most valuable process for the diagnosis of the disease." [A praiseworthy and well documented piece of work.]

H. Harold Scott

ROMAÑA, C. & GI, J. Xenodiagnostico artificial. [**Artificial Xenodiagnosis.**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1947, Nov., v. 2, No. 1, 57–60, 1 fig.

The English summary appended to the paper is as follows :—

" The authors describe a dispositive for practising *artificial xenodiagnosis* for cases in which it is not possible to perform it directly upon the patients. It consists of a tube closed with the skin of a laboratory animal which contains the suspected defibrinated or citrated blood. The triatomid bugs are placed in another tube in which is inserted the first mentioned. By this method they have obtained *positive human xenodiagnosis.*"

BARRETO, A. L. de B. Provas subsidiárias no diagnóstico da doença de Chagas. [**Subsidiary Tests in the Diagnosis of Chagas's Disease.**] *Arquivos Univ. Bahia Facul. de Med.* 1946, v. 1, 285–320. [75 refs.] English summary.

ROMAÑA, C. Miocarditis crónica esquizotripanosica. (Hallazgo de *Schizotrypanum cruzi* en el corazón). [**Chronic Myocarditis in Infection with** *Trypanosoma cruzi.*] *An. Inst. Med. Regional.* Tucuman, Argentina. 1947, Nov., v. 2, No. 1, 1–18, 15 text figs. & 2 coloured figs. on 1 pl.

The English summary appended to the paper is as follows :—

" The clinical history is related of a patient with a supposed diagnosis of cardiac form of Chagas' disease. In the autopsy there were found in the heart lesions of chronic infiltrative and sclerous myocarditis and dividing forms of *S. cruzi.* In the epicardium and especially in the fibrous auriculo-ventricular circular band were observed great cellular accumulations in which the lymphoid cells predominate ; the true character of which is discussed in the text."

ROMAÑA, C. Encefalopatias de posible origen esquizotripanosico. [**Encephalopathy possibly caused by** *Trypanosoma cruzi* **Infection.**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1947, Nov., v. 2, No. 1, 19–39, 5 figs.

The English summary appended to the paper is as follows :—

" The author, after commenting on the present state of knowledge of the nervous forms of the Chagas' disease, relates the clinical history of three cases of chronic encephalopathy in which the only possible cause manifested was the *S. cruzi* infection.

" The patients present a syndrome of psychic states and of spastic paralysis which agree with the classical descriptions which Chagas and Villela gave for the nervous forms of the disease."

LEISHMANIASIS

BALLABRIGA, A. A propos des manifestations cliniques et des complications du kala-azar infantile. [**Infantile Kala-Azar.**] *Ann. Paediatrici.* 1946, Dec., v. 167, No. 6, 364–72, 5 figs.

The paper gives an account of 40 cases of infantile kala azar which the author had under her care in Barcelona during the past three years. The symptoms described are typical of the disease which is said to be quite common in Spain.

C. M. Wenyon

Row, R. & Patkar, N. A. **Kala-Azar of Undoubted Indigenous Origin discovered in Dry Areas.** *Indian Physician.* 1947, Nov., v. 6, No. 11, 251–3.

Report of a case from Bombay.

Most, H. & Lavietes, P. H. **Kala Azar in American Military Personnel. Report of 30 Cases.** *Medicine.* 1947, Sept., v. 26, No. 3, 221–84, 10 figs. [24 refs.]

During, or as a result of, World War II, 50 to 75 cases of kala azar occurred in members of the United States Army. Most of these cases were studied very carefully and thirty came within the direct experience of the authors. These thirty cases form the basis of this paper, which is an excellent study of kala azar, primarily clinical in outlook. It will naturally be impossible to do it justice in a short summary.

Fifteen patients acquired the infection in India and 15 in the Mediterranean area, North Africa, Sicily or Italy; in the latter group was included a man who had served in London, Paris and Nice, the last for only one week three weeks before the onset of symptoms.

Most of the patients had spent nights in native villages within the endemic areas. Two officers lived in the same billet in Calcutta. [The reviewer was consulted by one of them in the U.S.A., and ascertained that these two officers shared a ground-floor flat in a part of Calcutta which he knew well as a highly endemic area.] The incubation period varied from 3 weeks in one case, to at least 19 months in another.

The onset was sudden, with fever, in 29 cases. The fever showed a double rise during the day in fifteen cases. One patient was afebrile throughout the observed course of the disease. Headache occurred in eight persons and was the commonest of the minor symptoms. Loss of weight was almost constant, but despite this and the fever, few of the patients appeared to be acutely ill at any stage of the disease. The tongue was not usually coated. In seven patients, cervical adenopathy was prominent; in 5, gland biopsy showed leishmania either at the first examination or on re-examination of the sections. No heart changes were noted.

The spleen was found enlarged in 27 patients at first examination, and in the other three enlargement developed later; 22 had enlarged livers at some stage of the disease. The spleen varied in size from being just palpable to reaching well below the umbilicus; the enlargement was very rapid, in some cases this level was reached within three months. There were no mental or neurological changes.

In almost every case malaria was suspected at first. The other febrile diseases considered were: brucellosis in five cases; subacute bacterial endocarditis and miliary tuberculosis each in one case; dengue in two; typhoid or typhus in five; amoebiasis in three; pneumonia in two patients, one of whom actually had pneumonia also; infective hepatitis in two; histoplasmosis in one; nephritis in two; and in nine cases, fever of uncertain origin (FUO) was the last diagnosis when the patients were transferred to a general hospital "after continued study and failure to establish a diagnosis". In addition to these, "Hodgkin's disease, acute aleukaemic leukaemia, aplastic anaemia and infectious mononucleosis were considered seriously in approximately 50 per cent. of our cases, and in some patients one of these diagnoses was considered tenable for at least three months".

Sternal puncture was performed on 29 patients on one or more occasions; the first puncture was positive in 14, subsequent punctures in seven, and a negative puncture only was recorded in eight cases. Spleen puncture was performed on 18 patients and gave positive results in all.

The average period from onset of symptoms to diagnosis was 10 weeks, and six patients were under observation in hospital from 4 to 6 months before a diagnosis of kala azar was made.

The drugs used were fouadin, neostam, stibanose, neostibosan and stilbamidine, and the percentage case cure rates were 0, 42, 50, 95 and 100 : fouadin and stilbamidine were used only in two cases each.

Neostibosan was given in total doses of 5·0 grammes in 10 to 17 days, intravenously in a 5 per cent. solution. No toxic symptoms were observed. Toxic symptoms were observed in most of the patients who received neostam. The failures with neostibosan were usually due to inadequate dosage ; one patient, however, after having had small amounts of fouadin, neostam and neostibosan overseas, received two courses of neostibosan, of 5 and 10 grammes respectively, and one of stibanose, without permanent improvement ; he was eventually cured by 4·0 grammes of stilbamidine.

" Napier's formol-gel test " was positive in only half the cases in the first three months, but in 12 out of 14 after three months. The correlation with hyperglobulinaemia was not complete, as occasionally, especially after treatment, a clear firm gel (negative) occurred in the presence of over 4·2 per cent. of globulin. Electrophoretic studies were made and it was concluded that the globulin peculiar to leishmaniasis is a soluble gamma globulin which binds subnormal amounts of calcium. The authors suggest that it arises as an immune reaction or as a result of destruction of parasitized reticulo-endothelial cells.

Leucopenia and granulopenia were constant findings : 15 out of 28 patients had white counts below 4,000 per cmm. at the first examination, and three out of 11 who were examined within the first 10 days of symptoms had counts below this figure. No counts below 1,000 white cells or 500 granulocytes were encountered.

The red cell counts in 20 cases observed before treatment in the Moore General Hospital were all between 2·91 and 3·86 millions, and within one month of successful treatment they ranged between 3·51 and 4·50 millions. The cells were usually slightly hypochromic and slightly macrocytic.

There was no marked prolongation of bleeding time or clotting time, but in a few cases clot retraction was retarded. The platelet counts were all subnormal, but extreme degrees of thrombocytopenia were not observed. Serum calcium was in the lower normal range.

The reticulocyte count was normally low before treatment and the authors claim that a significant crisis occurred in each of the six cases followed through treatment ; the peak, which was over 10 per cent. in only two cases, namely 14·8 per cent. and 15 per cent., occurred between the 13th and 18th days after the first injection.

The erythrocyte sedimentation rate was usually, but not constantly, increased ; it was not found of any value in predicting the activity of the disease.

There was no indication of liver dysfunction before, during, or after treatment.

Out of 25 patients observed during an acute period of the disease, 16 showed albumin in the urine, 12 microscopic haematuria, and in two there were clinically important renal complications. There was one case of chronic renal insufficiency after successful treatment with neostibosan and in another a classical acute glomerulo-nephritis developed ; this was approximately coincident with the onset of kala azar.

The paper includes individual case reports of these 30 cases.

The 24 references are to papers and books published in the United States or China ; the vast literature that has emanated from Europe, North Africa, and India is ignored. [The reviewer's predominating impression on reading this important paper is that it demonstrates what an extraordinarily standardized

disease kala azar is in the adult, whether the infection is acquired in India or in the Mediterranean area. Any one of the better textbook descriptions of this disease could have been compiled from this series.] *L. E. Napier*

LEVY, M. D., Jr. & YIENGST, M. J. **Kala-Azar. Report of a Case showing Unusual Leukocyte Response and Prolonged Incubation Period.** *J. Amer. Med. Ass.* 1948, Jan. 10, v. 136, No. 2, 81–4, 2 figs.

Report of a case with an incubation period of some 17 months.

BURCHENAL, J. H., BOWERS, R. F. & HAEDICKE, T. A. **Visceral Leishmaniasis complicated by Severe Anemia—Improvement following Splenectomy.** *Amer. J. Trop. Med.* 1947, Nov., v. 27, No. 6, 699–709, 3 figs. [29 refs.]

This is a report of a case of kala azar that was unusually resistant to treatment, but was eventually cured after splenectomy. The patient, a negro soldier, aged 23 years, was infected in North Africa during 1943. The first symptoms appeared in February, 1944. He was treated with quinine, penicillin, sulphadiazine and blood transfusions without effect before a diagnosis was made by a splenic puncture in April 1944. During the next 20 months he received 1·2 gm. of neostibosan, 0·96 gm. of anthiomaline, a course of solustibosan (? amount), 3·6 gm. of neostibosan, four courses of diamidinostilbene of 1·75 gm., 2·0 gm., 1·2 gm. and 1·8 gm., respectively, 1·7 gm. of neostibosan, 3·6 mgm. of Sb. by iontophoresis, 6·0 gm. of neostibosan, 4·84 gm. and finally 6·425 gm. of diamidinostilbene. At the end of the last course of injections, his spleen weighing 3,050 grammes, was removed on 11th December 1945.

Before splenectomy, fever, with remissions of a few weeks only was constant. The patient was underweight and the spleen reached below the level of the umbilicus. The white-cell count ranged between 1,000 and 4,000 per cmm. and the red cell count remained between 1 and 3 millions despite 85 transfusions of whole blood of 500 ml. each. The total protein was 11·8 [? 11·0] with globulin 7·5 gm. and albumin 3·5 gm. at one stage.

Sternal and splenic punctures were consistently positive until October, 1945, when three spleen punctures and a sternal puncture were negative in smear and culture.

After operation, the first 24 hours were stormy but subsequently the patient made a rapid and almost uninterrupted recovery, he gained 35 pounds in 10 weeks and except for a few days when he had an upper respiratory infection he remained afebrile ; he was well up to the time of the report, 16 months after splenectomy. The white cell count shot up to 22,900 in the evening of the splenectomy and then fell to levels within the normal range. The red cell count and haemoglobin percentage rose to 4 millions and 80 per cent., respectively, where they remained for six weeks and finally rose further to the normal level. Before treatment, the polymorphonuclear count was 32 per cent. of 1,750 per cmm. but there are no references to subsequent differential counts. The plasma proteins returned to normal by the 7th week and the formol-gel became negative at the 12th week after splenectomy.

The spleen showed a large infarct sharply demarcated from the surrounding parenchyma. There was diffuse reticulo-endothelial proliferation, considerable destruction of the splenic architecture, and areas of fibrosis. There was much phagocytosis of blood pigment, and viable leishmania were recovered from his spleen.

The possible causes for the early failures of treatment are discussed ; it was noted that the early antimony courses were inadequate and the possibility that antimony resistance developed is mooted, but this would not explain the failure of a total dosage of 18·015 gm. of diamidinostilbene over a period of 13 months.

The question of the removal of the spleen has to be considered under four headings ; namely, its effect on the leishmaniasis, the anaemia, the leucopenia and the comfort of the patient. It was thought that the infection was possibly persisting in the spleen where it could not be reached in sufficient concentration by the anti-leishmania drugs. The persistent anaemia despite many blood transfusions might be produced by the enlarged spleen in several different ways : by providing a large haemostatic pool for blood and thereby increasing haemolysis ; by providing an increase of reticulo-endothelial tissue which itself might increase blood destruction directly, or indirectly, by increasing the globulin in the blood and causing pseudo-agglutination and rouleau formation ; or by splenic control of haemopoiesis. Hypersplenic conditions are also recognized as a cause of granulopenia. In this case the operation was successful on all four counts.

References in the literature to splenectomy in kala azar are discussed. These included two successful cases reported by MARTIN, CHORINE and ROUESSÉ [this *Bulletin*, 1936, v. 33, 30] and SWEENEY, FRIEDLANDER and QUEEN [*ibid.*, 1946, v. 43, 114]. *L. E. Napier*

COLLARD, P. J. & HARGREAVES, W. H. **Neuropathy after Stilbamidine Treatment of Kala-Azar.** *Lancet.* 1947, Nov. 8, 686–8. [11 refs.]

A peculiar nervous sequel to the treatment of kala azar by stilbamidine was pointed out by NAPIER and SEN GUPTA [this *Bulletin*, 1942, v. 39, 748]. This consisted of paraesthesia and anaesthesia of the face in the distribution of the trigeminal nerve. Later, SEN GUPTA [*ibid.*, 1944, v. 41, 273] reported it as occurring in 17 of 104 patients given the drug.

OASTLER and FIDLER [*ibid.*, 1946, v. 43, 1029] reported that two patients treated for Sudanese kala azar by stilbamidine had died, late in convalescence, from renal, hepatic and pancreatic damage. Similar lesions were produced in dogs by the same solution, but no lesions were produced by a freshly prepared solution. However, YORKE and FULTON [*ibid.*, 1943, v. 40, 23] and FULTON [*ibid.*, 683] showed that although the freshly prepared solution did not produce lesions in these organs, it did produce lesions in the central nervous system.

The present authors' first patient was invalided from Malta in November 1943 with kala azar : he failed to respond to two courses of neostam, but did so dramatically to a course consisting of 1·45 gm. of stilbamidine. A steady flow of cases of kala azar came in from North Africa, Sicily and Italy, and stilbamidine was given in most cases with excellent immediate results ; but by the end of 1944 an alarming number of cases with facial symptoms had been found during the follow-up, and subsequently this drug was replaced by carbostibamide and urea stibamine.

Of 24 cases in which stilbamidine was used, 22 developed the neuropathy 2 to 8 months after completion of treatment : the other two patients were not seen, but made no complaint of these lesions in their answers to a written questionary.

The symptoms were anaesthesia of the face and sometimes of the neck, scalp and chest ; paraesthesia ; hyperaesthesia so that light touch or shaving caused an agonizing pain ; itching of the eyelids ; watering of the eyes ; and blinking. The skin over the same area was sometimes dry and atrophic. The corneal reflex was depressed but never lost. The condition remained at its maximum up to 18 months and then gradually improved. No treatment had any effect. The disability was a serious one.

Napier and Sen Gupta [*loc. cit.*] suggested that the lesion was in the principal sensory nucleus of the trigeminal nerve and that it might extend caudally in the spinal tract. The authors consider that the lesion may extend further into the

central grey matter near the substantia gelatinosa Rolandi. The drug is related by its ethylene linkage to trichlorethylene, which also affects the cranial nerve nuclei, especially the fifth. *L. E. Napier*

MANGABEIRA-ALBERNAZ, P. Estudo critico do "pólipo da leishmaniose". [**Critical Study of the "Leishmanial Polyp".**] *Brasil-Medico.* 1947, Aug. 2 & 9, 16, 23 & 30, Sept. 6 & 13, v. 61, Nos. 31–32, 33–34–35, 36–37, pp. 283–91 ; 301–6 ; 319–23, 19 figs. [70 refs.]

The author more than 20 years ago described polypi of the nasal septum in leishmaniasis (*Ciência Médica*, 1925, v. 3, 113 and *Arch. Internat. de Laryngol.* 1926, v. 32, 139) and under the title "the Leishmania polyp" in *Brasil-Médico*, 1928, v. 42, 729). [In spite of this it is not mentioned in textbooks of Tropical Medicine, though STITT has a brief reference to oro-nasal leishmaniasis in his chapter dealing with leprosy.]

In the present article, the author describes in detail and depicts in photographs and drawings four forms of the condition : (1) The fibrous sessile type ; (2) The peduncular mucoid type ; (3) The pendulous, the most common in which the tumour moves in the perforated septum ; and (4) The diffuse hyperplastic. The histology is shown in a series of photomicrographs and the distinctions between this and tuberculous, syphilitic and other nasal tumours. On the scar or base of a leishmanial lesion a non-leishmanial tumour may grow. One illustration shows an angiofibroma which was removed from the nose and which had been growing from the edge of a leishmanial perforation of the septum. Twenty-eight cases are recorded in this paper. *H. Harold Scott*

FEVERS OF THE TYPHUS GROUP

SMADEL, J. E., JACKSON, Elizabeth B. & GAULD, R. L. **Factors influencing the Growth of Rickettsiae. I. Rickettsiostatic Effect of Streptomycin in Experimental Infections.** *J. Immunology.* 1947, Nov., v. 57, No. 3, 273–84, 1 fig. [11 refs.]

This study is in continuation of the investigation referred to in this *Bulletin*, 1948, v. 45, 168.

Strains of *Rickettsia prowazeki*, *R. mooseri*, *R. orientalis*, *R. akari*, and *Dermacentroxenus* [*Rickettsia*] *rickettsi* were cultivated in yolk sacs and employed in the tests in the usual way.

Doses of 10-20 mgm. of streptomycin produced an appreciable inhibitory effect on all the rickettsiae except *R. orientalis* ; *R. akari* was most strongly affected. The addition of 0·4 mgm. of nitroacridin to 10 mgm. doses of streptomycin caused an additional degree of inhibition of growth of *R. mooseri*, and *R. rickettsi*, but not of *R. akari*. The addition of 0·5 mgm. of *para*-aminobenzoic acid caused a pronounced degree of additional inhibition of growth of all the organisms except *R. orientalis*. These synergic effects are regarded as being of possible importance in connexion with treatment of the diseases.

John W. D. Megaw

CAMAIN, R. Sur une similitude d'affinités tinctoriales. Limitation des résultats donnés par la coloration des rickettsies au Machiavello et au Giemsa bouillant. [**Limitations in the Results obtained by Staining of Rickettsiae by Machiavello's Method and Hot Giemsa.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 9/10, 325–6.

The author examined the possibility of finding in certain micro-organisms inclusions having staining properties analogous to those of the ruby-red homogeneous bodies found in typhus material by GIROUD and PANTHIER [this *Bulletin*, 1942, v. 39, 753].

He used the routine stain employed in his laboratory, namely "boiling Giemsa and Machiavello," to stain blood films from mice infected with *Trypanosoma gambiense*. In this way, he was able to demonstrate grains of volutin in the anterior part of the cytoplasm. Nevertheless, the author believes that the supposed affinity in staining properties between volutin and rickettsial bodies is only apparent, because when the different processes in Machiavello's method are tested and analysed separately, it will be seen that, if the methylene blue counterstain alone is used, the rickettsiae stain pale blue, but the volutin now stains violet black ; yet, with combinations of fuchsin, citric acid and methylene blue used in the full staining process, rickettsiae and volutin alike stain reddish purple. Since it is also known that the rickettsiae of scrub typhus take only the blue stain by Machiavello's method, the author concludes that, whatever the nature of volutin and of the inclusions in higher organisms tinctorially resembling it, the use of Machiavello's method and of hot Giemsa do not provide a certain diagnostic criterion for detecting rickettsiae.

H. J. O'D. Burke-Gaffney

BINAGHI, G. Tifo esantematico benigno a Cagliari. [**Mild Epidemic Typhus in Cagliari.**] *Acta Med. Italica.* 1947, Oct., v. 2, No. 10, 327–9. English summary (2 lines).

An account of 24 cases.

MONTGOMERY, T. H. L. & BUDDEN, F. H. **Typhus in Northern Nigeria. I. Epidemiological Studies.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Dec., v. 41, No. 3, 327–37, 2 figs. & 2 graphs.

An outbreak of louse-borne typhus occurred during the months June to September, 1945, in Jos, a town of about 20,000 inhabitants situated at a height of about 4,000 feet on the Bauchi Plateau, North Nigeria. The cases detected numbered 126 ; of these, 32 were fatal.

All the attacks occurred among persons living in 58 of the 1,600 compounds contained in the town. Louse infestation was heavy and almost universal.

In 92 cases, a Weil-Felix titre of more than 1–100 was observed.

Despite early difficulties, dusting with DDT powder soon became effective, and when the people experienced the comfort of being free from lice and bedbugs they clamoured for the powder.

The authors stated that spare clothing, etc., after being dusted, were kept for 48 hours in closed dustbins ; no lice survived this treatment.

John W. D. Megaw.

FINDLAY, G. M. & ELMES, B. G. T. **Typhus in Northern Nigeria. II. Laboratory Investigations.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Dec., v. 41, No. 3, 339–52. [14 refs.]

The authors describe their very thorough laboratory investigation into the outbreak of typhus fever referred to in the previous abstract.

Rickettsiae were isolated by guineapig inoculation from five out of seven batches (30–40 in each) of lice collected from patients, and from the blood of nine out of ten patients. Some of the human strains were passaged 7 to 20 times serially through guineapigs. In the early passages all the strains caused some degree of scrotal reaction, but after the 8th to 10th passages few reactions occurred, and none was observed after the 15th passage. Mooser cells were very occasionally seen in the tunica exudate. Rickettsiae were isolated from fleas (*Xenopsylla cheopis*) that had been caused to feed on a giant bush rat (*Cricetomys gambianus*) previously inoculated with one of the strains, but this observation was not regarded as showing that the strain was murine.

The sera of 92 patients gave high-titre agglutinations with *Proteus* strains—82 with *OX19* and 10 with *OX2*. Of 31 sera tested for rickettsia agglutination, 27 gave higher-titre reactions with epidemic than with murine strains, the remaining four reacted more strongly with murine strains. Four sera were tested by the complement-fixation test; two reacted more strongly with epidemic than with murine antigens and two reacted at the same high titres with both antigens.

Various animals were tested for susceptibility to inoculation with suspensions of brains and spleens of infected guineapigs; the intraperitoneal route was employed except when otherwise stated.

In rabbits, a thermal reaction was sometimes produced, and in other rabbits, inoculated intratracheally, fever and patchy pneumonia developed; rickettsiae were found in lung smears. Dogs showed no obvious reaction, but their blood on the 8th to the 15th day was infective to guineapigs. Out of seven green monkeys (*Cercopithecus aethiops centralis*) three gave a febrile response and their blood was infective to guineapigs. Another green monkey was inoculated intratracheally; a febrile reaction followed and rickettsiae were found in the lungs and blood. Eight other monkeys, belonging to four different species, were inoculated; there were no apparent reactions but the blood of two became infective to guineapigs. White mice were not affected by intranasal inoculation of the suspensions, but developed patchy pneumonia when suspensions of infected rabbits' lungs were used, and five successive lung passages were made.

Several kinds of wild rodents gave no apparent reactions, but infection was found in their blood.

The authors mention that flea-borne typhus is known to be widely distributed in West Africa and they refer to unpublished observations which strongly suggest that tick-borne infection also occurs. They state that rickettsiae were isolated from the blood of a European officer in Bauchi, Nigeria, and that his serum gave a positive complement-fixation reaction with a South African tick typhus antigen, but not with murine or epidemic antigens. The serum gave a negative rickettsia-agglutination reaction with epidemic and murine rickettsiae. Two similar cases are said to have occurred in North Ashanti.

A very puzzling case is described as occurring at Kaduna, 180 miles distant from Jos. Just before admission to hospital the patient found, attached to her scalp, a flat, oval, six-legged, "insect", about one-eighth of an inch long, brown in colour with diffuse mottling. At the site of attachment there was afterwards an eschar with local adenitis.

The rash was maculo-papular; it involved the palms and soles. On the 17th day the *OX2* titre was 1–320 and the *OX19* titre only 1–20.

The complement-fixation titre was found by Major J. Gear, S.A.A.M.C. to be 1–50 with each of four strains of epidemic antigen and 1–12·5 with murine and tick-borne antigens. Rickettsia agglutination was at 1–100 with epidemic and at 1–25 with murine strains.

Rickettsiae were isolated from the patient's blood; in the earlier passages through guineapigs there was a pronounced haemorrhagic scrotal reaction, but this did not occur in the later passages. Cross immunity with the Jos strain was shown by guineapig inoculation.

No known case of rickettsial infection could be discovered from which the patient might have been infected.

The authors state that the history of an insect bite and the occurrence of an eschar suggested tick-borne infection and the behaviour of the strain in guineapigs suggested murine infection but the serological reactions were weighty evidence for an epidemic strain.

This is distinctly a problem case. Other points in favour of a tick-borne infection are the type and distribution of the rash, the *OX2* type of Weil-Felix reaction, and the absence of any evidence of other source of infection. Either of the two sets of conflicting evidence might be regarded as conclusive, but one must be wrong. *John W. D. Megaw*

MONTGOMERY, T. H. L. & BUDDEN, F. H. **Typhus in Northern Nigeria. III. Clinical Studies.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Dec., v. 41, No. 3, 353–62, 3 charts.

This paper contains a description of the clinical features of the outbreak referred to in the previous two papers. The authors state that the clinical picture did not conform to the classical text-book descriptions of louse-borne typhus in the following respects :—there was complete absence of rash, diarrhoea, vomiting, gangrene, pressure sores, venous thrombosis, and pupillary contraction. [But the absence of a rash is quite usual among dark-skinned persons and the other features mentioned above are often missing in outbreaks of the disease.] *John W. D. Megaw*

GOYTIA, R. S. Contribución al estudio de la sedimentación globular en enfermos de tifo exantematico. [**A Contribution to the Study of the Erythrocyte-Sedimentation Rate in Typhus Patients.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1947, June, v. 8, No. 2, 97–117, 11 charts. English summary.

The author describes the results of a systematic study of the changes occurring in the sedimentation rate at different stages of attacks of typhus fever. Of the 78 patients tested, 61 had classical, and 17 had murine, typhus.

In most of the cases there was a progressive increase in the sedimentation rate till the end of the first week of convalescence, and then a very slow return towards normal, but many irregularities were observed. In mild attacks there was little or no departure from the normal. Complications gave rise to a sudden increase in the rate. Among six fatal cases in which there were no complications, three showed no sedimentation, one showed a normal rate, and in the other two the rate increased progressively till the day of death when a sudden return to normal was observed.

On the whole, there was a direct relationship between the degree of increase in the acceleration of the sedimentation rate and the severity of the illness, but there were striking exceptions to this rule.

The method employed was that described by CUTLER (*Amer. J. Med. Sci.*, 1932, v. 183, 643). Illustrative curves and details of the average rates observed at various stages of the illness are presented. *John W. D. Megaw*

RAYNAL, J. H. **Relationship between the Incidence of Typhus Fever among the Human and Murine Populations of Shanghai.** *Chinese Med. J.* Shanghai. 1947, July–Aug., v. 65, Nos. 7/8, 211–24. [15 refs.]

Two papers by the same author dealing at greater length with the same subject have already been reviewed [this *Bulletin*, 1947, v. 44, 893, 1059].

LIU, W. T., CHANG, F. L. & LIN, C. C. **Typhus Fever in Chengtu. A Clinical Study of 184 Cases.** *Chinese Med. J.* Shanghai. 1947, July–Aug., v. 65, Nos. 7/8, 199–210. [23 refs.]

The authors saw 184 cases of typhus fever in two hospitals in Chengtu during the years 1940–1944. The great majority of the cases appear to have been flea-borne. The incidence month by month was as follows :—January, 10 ; February, 9 ; March, 9 ; April, 14 ; May, 7 ; June, 5 ; July, 9 ; August, 16 ; September, 37 ; October, 27 ; November, 27 and December, 14. There was no evidence of transmission to contacts except perhaps in a few severe cases occurring during the winter and early spring among persons who had recently arrived in Chengtu after travelling from distant places.

Among the Weil-Felix tests that were carried out 75 patients gave positive reactions with *Proteus OX19* ; of these, 39 also reacted with *OX2*, and 7 with *OXK*. Three patients who gave negative reactions with *OX19* reacted with *OX2* at a titre of 1–160. *John W. D. Megaw*

NYKA, W. **Development of the Inflammatory Lesions and of Rickettsiae of Murine Typhus in the Lungs of Rats.** *Amer. J. Path.* 1947, Sept., v. 23, No. 5, 843–56, 32 figs. on 3 pls.

The histological changes observed in the lungs of rats sacrificed at intervals ranging from three minutes to 72 hours after inoculation by the nasal route with suspensions of murine rickettsiae are described.

The main part of the paper consists of a description of the development of the rickettsiae in the same lungs.

As early as five hours after inoculation, adult rods and diplococci are found, some of them in small intracellular clumps which are regarded as the earliest forms of rickettsial colonies developing from " dot forms " of the organisms. Later the clumps enlarge and rods and diplococci are seen to emerge from them and often to escape from the cells and enter other cells in which they continue to multiply.

After about 48 hours, pronounced extracellular multiplication is observed, associated with the formation of clumps, which here as well as inside the cells sometimes grow to a considerable size. No evidence was found to support the view that invisible forms of the organism occur, and the clumps are regarded as being nothing more than colonies of rickettsiae ; there seemed to be no reason to assume that they represent a special developmental phase in the life cycle of the organisms.

The description of the multiplication of the rickettsiae is attractively simple, every statement is supported by a reference to one or more of the 32 clear photomicrographs which illustrate the paper. *John W. D. Megaw*

JADIN, J. Fièvre rouge congolaise ou typhus murin à Costermansville. [**The Red Fever of the Congo or Murine Typhus at Costermansville.**] *Ann. Soc. Belge de Méd. Trop.* 1947, June 30, v. 27, No. 2, 231–40, 1 chart. [18 refs.]

Orchitic strains of rickettsiae, regarded as of murine type, were isolated from two out of five patients who were regarded as suffering from " *fièvre rouge*

congolaise," a syndrome described by the author as characterized by fever and a rash which is often conspicuous and is accompanied by polyadenitis.

In one of the two positive cases, the Weil-Felix titre on the 12th day was 1–250 with *Proteus OX19* and *OX2* strains ; in the other the *OX19* titre rose to 1–20,000 and the *OX2* to 1–1,000 ; there was an eschar and the patient had removed ticks from his dog 11 days before the onset.

Two of the other cases were of a husband and his wife ; the onset was on the same day, and in each there was a lesion which might have indicated the point of entry of the infection. On the 10th day, the husband reacted at 1–10,000 with *OX2* and was negative with *OX19*, the wife reacted only with *OX19*, at a titre of 1–50.

The cases occurred at Costermansville—at an altitude of 1,460 metres—south of Lake Kivu in the Belgian Congo. *John W. D. Megaw*

LINDUSKA, J. P. & MORTON, F. A. **Benzene Hexachloride for Area Control of Trombiculid Mites.** *Amer. J. Trop. Med.* 1947, Nov., v. 27, No. 6, 771–7.

During the recent war, it was observed that scrub typhus was frequently contracted shortly after arrival in infested zones. Tests were therefore conducted to find a powerful insecticide to produce a rapid destruction of mites in invasion areas.

Benzene hexachloride (12 per cent. *gamma*) was found to be highly efficient in several forms (but best of all when diluted to 25 per cent. in talc). Applications of 6 lb. per acre and over were lethal to over 95 per cent. of the mites *Acariscus masoni* and *Eutrombicula alfreddugesi* (in 1/1000th and 1/250th-acre plots) and kept the mite population low for over three weeks. Larger trials with applications by aeroplane gave similar results. Applications of wettable sulphur at 100 lb. per acre were less effective than 2·5 lb. benzene hexachloride. The latter was also very effective if absorbed into sawdust, rabbit food pellets, etc., and scattered about in this form (but rather higher doses were required). It was believed that the results were partly achieved by a fumigation effect of the insecticide. *J. R. Busvine*

TICHENOR, C. J., ROSS, S. & MCLENDON, P. A. **Rocky Mountain Spotted Fever. A Preliminary Report on the Use of Para-Aminobenzoic Acid.** *J. Pediatrics.* 1947, July, v. 31, No. 1, 1–23, 9 charts. [15 refs.]

This interesting paper deals primarily with a trial of para-aminobenzoic acid in eight cases of Rocky Mountain spotted fever. The authors were satisfied that the drug had a beneficial action in six of the cases, but as they admit the series of cases was not large enough by itself to prove the efficacy of the drug and there were no comparable controls. The results, however, tend to strengthen the prevailing belief that the drug has a definite action in fevers of the typhus group, especially when the treatment is started early in the course of the attacks.

In five cases, cephalin-flocculation tests were carried out five to twelve days after the commencement of the treatment ; the reaction was positive in all five patients so that there was a suggestion that the drug might have caused some damage to the liver. As a control, six normal children, selected at random, were given similar courses of the drug for four days ; four of them gave positive reactions. These and other tests suggested the possibility that the drug might have a toxic effect, especially if the liver had already been damaged by the infection.

The dosage recommended for children weighing 20 to 80 lb. was 0·33 to 0·5 gm. daily for each pound of weight, given in divided doses every two hours.

With such doses, the blood level of the drug was maintained at between 15 and 40 mgm. per cent. The treatment was continued for about seven days. Daily leucocyte counts were made; in one case, leucopenia and granulocytopenia occurred after nine days' treatment, when the total white-cell count was 3,600 and the polymorphonuclear percentage fell to 16; four to five days after withdrawing the drug " the count rose ".

Some points in the clinical description are of interest. In two cases no history of tick bite was obtained; in three cases a tick had been found attached a few days before the onset; in the remaining cases no reference is made to the question of tick bite. Workers in other countries will be interested to find that the authors attached considerable diagnostic importance to the type and distribution of the rash, which usually appeared on the 3rd or 4th day, first on the extremities and later extended all over the body. The rash consisted of raised rose-red macules which later became deep red or purplish.

The Weil-Felix reaction (*Proteus OX19*) was positive in all cases, but never before the 6th day. In all but one of a series of 36 cases, the titre rose to 1–160 or over in the 3rd or 4th week, but this titre was reached in only two of the cases on the 12th day. *John W. D. Megaw*

PARTELIDES, G. **A Case of Fièvre Boutonneuse in Cyprus.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Dec., v. 41, No. 3, 363–4.

Although Cyprus is in constant communication with countries where typhus-like fevers occur, no such cases had been reported in that island before 1941. In that year, the author and Dr. Coureas in Nicosia diagnosed a single case, based on clinical features and laboratory findings, but the exact type of infection remained unknown, and no further cases were reported up to now. [In the first case reported above, intraperitoneal inoculation of the patient's blood caused scrotal swelling in a guineapig and the Weil-Felix reaction was 1/10,000: but the antigens used are not indicated.]

A case is now reported in a man of 45 who suffered from a fever for 16 days which clinically suggested typhus; at first, epistaxis and a sparse rash on the abdomen suggested typhoid fever. The other clinical features, which are described, resembled typhus; the mental condition remained fairly normal, there was a sloughing ulcer on the lower lip and between the 7th and the 10th day the rash involved the trunk and limbs, soles, palms and face, became maculo-papular and in some cases was raised. Blood culture, Widal test and blood examinations for parasites were negative, as was an X-ray of the chest. On the 10th day, *Proteus X19* agglutination was detected at 1/120, rising in two days to 1/500 and, at the end of the week, to 1/1,250. Rickettsial agglutination and complement fixation tests were not available, but on the special clinical features of the distinctive rash, the primary ulcer and the absence of mental disturbances, a diagnosis was made of *fièvre boutonneuse*. It is stated that practically every dog in Cyprus harbours *Rhipicephalus sanguineus*. [For this reason, it seems reasonable to suppose that further cases may be discovered.]

H. J. O'D. Burke-Gaffney

GSELL, O. Q-Fever (Queenslandfieber) in der Schweiz (endemische Pneumonien durch *Rickettsia burneti*). [**Q Fever (Queensland Fever) in Switzerland.**] *Schweiz. med. Woch.* 1948, Jan. 10, v. 78, No. 1, 1–8, 6 figs. [25 refs.]

The author, with the collaboration of Herald Cox, who carried out conclusive complement-fixation tests, has established the occurrence of Q fever in Switzerland.

In the first outbreak that was recognized, four patients belonging to the same family were treated in a hospital at St. Gallen in April 1947 ; later in the year three other groups of cases were seen in Switzerland.

Detailed clinical descriptions, illustrated by temperature charts and X-ray photographs, are given of seven cases. The clinical features correspond with those described recently by American observers.

The present paper deserves attention because it contains an exceptionally clear description of the cases and a very useful summary of all the earlier articles dealing with the disease ; it can fairly be described as a small monograph on Q Fever.

Neither the reservoir of infection nor the mode of transmission could be established with certainty, but the epidemiological conditions tended to confirm the prevailing conjecture that infection can be inhaled in the form of infected dust and that it is associated in some way with cattle.

John W. D. Megaw

DICK, G. W. A. & LEWIS, E. A. **A Rickettsial Disease in East Africa transmitted by Ticks** (*Rhipicephalus simus* **and** *Haemaphysalis leachi*). *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Dec., v. 41, No. 3, 295–326, 19 figs. (8 on 4 pls.) & 3 charts. [29 refs.]

This is an interim report which deals with tick-borne typhus occurring among troops and prisoners of war in East Africa during the years 1940–1945. It is of special interest because of the thorough manner in which the disease was studied by laboratory methods and because it is the most striking example yet recorded of what may happen when " islands " infested by infected ticks are entered by large numbers of newcomers.

In May 1944, cases of tick-borne typhus were recognized at a prisoner-of-war camp on the coast of the mainland opposite Mombasa Island : in September, 1944, cases began to occur in two Royal Air Force camps in the same neighbourhood : by December, 1945, 100 cases had occurred at the prison camp and 140 at the R.A.F. camps : the number of persons at risk is not stated. There were no deaths.

The close association of the incidence with rainfall is clearly shown by graphs. All the camps were on sites cleared of coarse vegetation, but surrounded by terrain covered with grass and scrub, and heavily infested by ticks, including *Rhipicephalus simus* (the most numerous species), *R. sanguineus* (more numerous than *R. simus* on dogs) and *Haemaphysalis leachi*.

In the systematic survey of the area no lice were found, fleas were few, and the only mites found were three adults collected from areas in which no cases had occurred. A favourite haunt of the ticks was the long grass overhanging the paths : from the tips of the grass ticks were readily brushed off by pedestrians, to whom they attached themselves.

From two out of 14 batches of *R. simus* and from two out of nine batches of *H. leachi*, strains of rickettsiae were isolated by guineapig inoculation : slight to moderate scrotal reactions were observed. One of seven guineapigs that were inoculated with macerated *R. sanguineus* had a typical febrile reaction, but no scrotal swelling occurred and rickettsiae could not be demonstrated.

After several failures to isolate the infection by inoculating guineapigs with small quantities of patients' blood, successful results were obtained in nearly every case by injecting doses of 6-10 cc. at the patients' bedside. Details are given of the results of the above inoculations.

An eschar was seen in 81 per cent. of the cases.

The results of the Weil-Felix reactions were puzzling : among 40 patients tested on the 5th, 10th and 15th days, 38 reacted with *Proteus OXK* at titres of

1–160 or over and 13 of these reacted at the above titres on the 5th day. Only five patients reacted with *OX19* at 1–160 : in one case, this titre was observed on the 5th day and on the 10th day the reaction was negative. Seven patients reacted with *OX2* at 1–160. Typical rising-titre reactions were the exception rather than the rule, and the authors admit that the *OXK* suspensions may have undergone deterioration.

A list of 10 points is given in which the disease is regarded as differing from louse-borne, flea-borne, and mite-borne typhus ; and although most of these are open to criticism, the disease seems undoubtedly to have been tick-borne. Although the authors mention the view of some American experts that the tick-borne disease is not a typhus fever, they prefer the name tick typhus as probably leading to less confusion and to a better differentiation of the rickettsial diseases of East Africa.

Cases of a similar disease diagnosed variously as tick-bite fever, tick typhus, and typhus syndrome, were reported by army medical officers during the same period from eight other areas in Kenya, from several areas in Abyssinia, British Somaliland, Eritrea, and the Anglo-Egyptian Sudan.

John W. D. Megaw

YELLOW FEVER

LÉPINE, P., LEVADITI, J. C. & SAUTTER, V., Mlle. Essais d'association des souches neurotropes du virus amaril et du virus vaccinal. [**Experiments in combining Neurotropic Strains of Yellow Fever and Vaccinia Virus.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 9/10, 340–43.

[Immunization against yellow fever has been combined with vaccination against smallpox in French West Africa, for a number of years. The two viruses are reconstituted from the dried state, pooled and inoculated by scarification. Although satisfactory immunity has been produced, there has been a tendency for other workers to decry the method. LAIGRET has recently suggested (see this *Bulletin*, 1947, v. 44, 580) that post-inoculation encephalitic accidents occur more frequently after the combined vaccination.]

The authors have attempted to obtain information, by animal experiment, as to the possibility of increased virulence or neurotropism when the viruses are combined.

A small number of experiments showed that when the combined viruses were inoculated intracerebrally into the mouse, only the neurotropic yellow fever virus survived or multiplied and it did not alter its character. In a similar fashion, only the neurotropic vaccinia virus survived or multiplied after intracerebral inoculation of the rabbit. When the two viruses were inoculated intradermally, only the vaccinia virus was infective, but in contrast to the control rabbits which received only vaccinia, the lesions were smaller and disappeared more rapidly.

[Though suggestive, these results do not settle the problem in man, because the agent or factors producing post-vaccinal encephalitis are unknown.]

F. O. MacCallum

DENGUE AND ALLIED FEVERS

SEMPLE, A. B. **The Control of Phlebotomus Fever.** *Med. Officer.* 1948, Jan. 24, v. 79, No. 4, 35–7, 4 graphs. [11 refs.]

An epidemic of sandfly fever in the shore-based establishment of the Royal Navy at Malta in 1945 was controlled by spraying the walls of the quarters with a 5·0 per cent. solution of DDT in kerosene. Three applications were made during the epidemic season at the rate of about one quart to each 1,000 square feet (56 mgm. per square foot).

A pronounced reduction in the sandfly nuisance was observed after the first spraying in July and it was noticed that houseflies became much fewer and that there were unusually few cases of dysentery and gastroenteritis.

From the table it will be seen that the September peak of 1945 was considerably lower than would have been expected if no spraying had been carried out. [The proportion of susceptible recent arrivals to men immunized by previous attacks is also an important factor; presumably this remained much the same because it is not mentioned.]

Some Rates of Weekly Incidence per 1,000

	June or July peak	Lowest rate in August	September peak
Navy Shore Establishment (1944) ...	29·7	12·7	33·5
,, ,, ,, (1945) ...	14·5	3·3	7·2
Army Establishment (1945)	3·3	0·9	1·5
R.A.F. Establishment (1945)	4·5	2·3	3·8

The lower rates for the Army and R.A.F. are attributed to better housing and longer residence in the infected area.

From a small-scale experiment, it seemed likely that ordinary mosquito nets sprayed with DDT solution were effective in protecting against sandflies.

In a brief reference to the clinical picture it is stated that a rash was seen in only one patient during the epidemic; that in a series of 500 cases occurring in Malta in 1945, 39 of the patients had two attacks during 1945 and four had three attacks; also that 53 of the patients had been attacked in 1944. CULLINAN and WHITTAKER [this *Bulletin*, 1944, v. 41, 126] have also described an epidemic in which the immunity was often short-lived.

John W. D. Megaw

JACUSIEL, F. **Sandfly Control with DDT Residual Spray. Field Experiments in Palestine.** *Bull. Entom. Res.* 1947, Dec., v. 38, Pt. 3, 479–88.

Following the encouraging results of HERTIG and FISHER [this *Bulletin*, 1945, v. 42, 758] further work was conducted in Palestine on spraying with DDT to control sandflies. The sandflies inside the houses were mainly *Phlebotomus papatasi* followed by *P. major* and *P. chinensis*. Those resting outside houses were observed to be mainly *P. major* and *P. chinensis* and rather fewer *P. papatasi*.

Spraying was done with a hand-operated " direct pressure " sprayer, and the 5 per cent. DDT in kerosene solution was applied to give about 2 gm. DDT per sq. metre (200 mgm. sq. ft). The ceilings and sometimes the top of the walls for a foot below the ceilings were treated; controls were left in the same houses and elsewhere. About forty or fifty houses were treated in various groups.

The results were entirely satisfactory in that only one or two sandflies per room were observed during periods of 52–58 days after spraying during the hot summer months. In untreated control houses, fairly high numbers were continually observed (30–300 except at the end of the season) but in control rooms in treated houses there was a distinct drop, probably because the flies were killed in the adjoining rooms.

An experiment to provide an outside lethal barrier against the flies was done by spraying all vertical objects (walls, posts, etc.) in the vicinity of a group of houses. This, however, was a failure. Nevertheless, it was observed that after treating houses with DDT, the inhabitants sitting *outside* in the evening were much less troubled by bites.

Some evidence is given to indicate a fall in sandfly fever among the troops in the area, as a result of widespread spraying of houses with DDT.

J. R. Busvine

KOPROWSKI, H. & COX, H. R. **Colorado Tick Fever. I. Studies on Mouse Brain adapted Virus.** *J. Immunology.* 1947, Nov., v. 57, No. 3, 239–35, 2 figs. [23 refs.]

In this and the next paper the authors describe further extensive studies of the virus of Colorado tick fever, which they had already shown to be adaptable to cultivation in mice and developing chick embryos [see this *Bulletin*, 1947, v. 44, 518].

In the present paper, numerous experiments are described which throw light on the pathogenic, immunological, and physical properties of the virus grown in the brain of dba (dilute brown Agouti) mice and albino Swiss mice.

Among the findings of general interest are the following : (1) Eight-day-old mice are as susceptible to intraperitoneal inoculation as are 28-day-old mice to intracerebral inoculation. (2) All the four strains of the virus that were tested proved to be immunologically distinct from 13 other viruses and rickettsiae, including the viruses of dengue, yellow fever, and several kinds of encephalitis, and the rickettsia of Rocky Mountain spotted fever. (3) Hamsters succumbed to the virus ; cotton rats and opossums showed no ill effects, but the virus was found to circulate in their blood ; sheep and rabbits were insusceptible. (4) The virus was readily filterable, its size was about 35–50 millimicrons. (5) The virus in saline-serum suspensions remained viable for 64 days, but not for 100 days, at room temperature ; at 37°C. it became inactive after 3–5 days. In the frozen or lyophilized state it remained potent for at least six months.

John W. D. Megaw

KOPROWSKI, H. & COX, H. R. **Colorado Tick Fever. II. Studies on Chick Embryo adapted Virus.** *J. Immunology.* 1947, Nov., v. 57, No. 3, 255–62. [14 refs.]

A strain of the virus, which had been adapted to passage through the brain of the mouse, was cultivated through 78 generations in the yolk sacs of developing chicks ; the maximum titre of activity was reached on the 4th or 5th day after inoculation. The virus was found in significant amounts only in the central nervous system of the embryo chicks ; it was virulent for mice when inoculated intracerebrally, but not when inoculated parenterally.

Minimal doses of the virus injected parenterally into mice produced immunity.

Virus of the 37th passage injected subcutaneously into four volunteers caused only minor clinical disturbances, but neutralizing antibodies were produced in each patient.

John W. D. Megaw

PLAGUE

EDNEY, E. B. **Laboratory Studies on the Bionomics of the Rat Fleas, *Xenopsylla brasiliensis*, Baker and *X. cheopis*, Roths. III. Further Factors affecting Adult Longevity.** *Bull. Entom. Res.* 1947, Dec., v. 38, Pt. 3, 389–404. [16 refs.]

The length of life of the adult *Xenopsylla* is of considerable importance in relation to the possible carriage of plague infection in merchandise: also because one collection of data appeared to show a simple linear relation between length of life of the starved flea and saturation deficiency of the atmosphere. Since then, large and puzzling anomalies have been recorded by HOPKINS [this *Bulletin*, 1936, v. 33, 359], LEESON [*ibid.*, 879] and others. The subject seems to become less comprehensible as more work is done on it.

The present author has cleared up at least some of the anomalies. He shows that if the larvae (*X. brasiliensis* and a few experiments with *cheopis*) are reared together in a culture jar, the adults live for a significantly shorter period than if the larvae are reared singly. Moreover, old parent fleas lay eggs which give rise to adult progeny which are shorter-lived than those of younger parents. Several other factors influencing the length of life of the starved adult flea are identified.

It is found that if the larval food is contaminated by the droppings of the mouse this has no significant effect on the length of life of the adult fleas (an unexpected result, for the droppings would be supposed to be a source of B vitamins derived from micro-organisms: presumably other material in the breeding medium provides these vitamins). Another unexpected but apparently well-established result is that unfed fleas live longer under several different standard conditions than those which have been fed once and then starved. [For previous papers in this series, see this *Bulletin*, 1945, v. 42, 504; 1947, v. 44, 1103.] *P. A. Buxton*

SIMEONS, A. T. W. & CHHATRE, K. D. **Further Observations on Plague.** *Indian Med. Gaz.* 1947, Aug., v. 82, No. 8, 447–51, 3 figs.

A previous communication [this *Bulletin*, 1947, v. 44, 77] related to 1,000 cases of bubonic plague treated with either sulphadiazine or sulphathiazole. The present series comprises 700 cases treated with sulphamerazine. Each batch was of 100 patients to whom was given: (1) 3 gm. initially followed by 1 gm. every 6 hours, but no injections; (2) one injection of 2·5 gm. in 50 ml. glucose [strength not stated] intravenously on admission and then 1 gm. orally every 8 hours; (3) injections of 2·5 gm. and 1 gm. 8 hours apart, followed by 1 gm. orally every 8 hours; and (4) 3 injections, initially 2·5 gm., then 2 injections each of 1 gm. at an interval of 8 hours, after which 1 gm. was given orally every 8 hours. A continuation of this last scheme of treatment was adopted for 300 other cases. In the previous work with sulphadiazine, the total mortality had been 18 per cent., and 8 per cent. in non-moribund cases. Now, in the 3-injection series with sulphamerazine, total mortality was 14 per cent. and 7·2 per cent. in non-moribund cases which, the authors acknowledge, is not a very significant difference. Since, however, the interval between doses can be prolonged to 8 hours with sulphamerazine as compared with 4 hours with sulphadiazine, they prefer the former. By starting temporary emergency village hospitals and so avoiding long and difficult transport of the patient, the chances of recovery were enhanced. The authors "consider it the ideal routine in plague control to treat the focus of an outbreak with DDT at once and intensively and to do no rat-baiting or inoculation in the focus." The use of

DDT especially seems to have been popular with villagers, because incidentally it got rid not only of fleas but also of bedbugs, flies and other pests. Curiously enough the use of cyanogas and kerosene-soap emulsion as an anti-epidemic measure, formerly advocated, is now regarded as " a too radical destruction of rats " and as having a merely ephemeral effect on fleas, so that on occasion it was followed by a sudden rise in plague incidence. *W. F. Harvey*

KARAMCHANDI, P. V. & RAO, K. S. **Streptomycin in Human Plague.** *Lancet.* 1948, Jan. 3, 22, 5 figs.

In this preliminary communication, relating to an epidemic of 152 cases and 66 deaths, five moribund plague patients were treated with intramuscular streptomycin only. The dose was 0·125 gm. every 3 hours for 72–96 hours ; improvement was evident with a total of 1·5 gm. ; no toxic effects were noted and all patients are now alive and well. Temperature charts and details are given. The five patients appear to have been the only cases treated, as the supply of streptomycin became exhausted. *W. F. Harvey*

RUEGSEGGER, J. M. & GILCHRIST. H. **Plague : a Survey of Recent Developments in the Prevention and Treatment of the Disease.** *Amer. J. Trop. Med.* 1947, Nov., v. 27, No. 6, 683–9. [28 refs.]

CHOLERA

CHRONICLE WORLD HEALTH ORGANIZATION. 1947, Nov., v. 1, No. 11, 157–61, 1 map. **Cholera in Egypt.**

This is a brief account of a major cholera epidemic arising in a small focus of four cases and spreading rapidly to affect all six Delta provinces by the third week. The epidemic seems to have followed the usual course which, so far as it has been recorded, involved a steep rise of incidence in the fourth week and a 24-hour peak-figure of 1,022 cases with 581 deaths. In the fifth week, the summit of the graph of incidence was reached with a weekly total of 5,976 cases and 2,933 deaths. After this, the decline set in and by the seventh week it was a daily decrease. Upper Egypt had its share of epidemic infection. No new areas were infected during the eighth week and " the decline in morbidity and mortality alike was continuous." These eight weeks produced 20,877 cases with 10,265 deaths, and the outbreak is compared with the last epidemic in Egypt, forty-five years ago, of 40,613 cases and 34,595 deaths. A noteworthy point, which is duly made, is that " the disease has failed to establish itself in any of the towns provided with satisfactory water supplies and adequate sewage disposal systems in spite of repeated introduction from the villages." The operations of a powerful world organization in co-operation with the authorities may reasonably be given the credit for the probable limitation of the present epidemic but in the words here cautiously set down : " Whether such decrease can be ascribed to the results of vaccination or to the spontaneous autumnal decline characteristic of each previous outbreak in Egypt it is too early to say."
W. F. Harvey

i. STRAUSS, W. **The Cholera Epidemic in Egypt and its Potential Danger to Palestine.** *Harefuah.* Jerusalem. 1947, Dec. 1, v. 33, No. 11. [In Hebrew 173–4, 1 map. English summary 174.]

ii. SILBERSTEIN, W. **Preventive Inoculation against Cholera.** *Ibid.* [In Hebrew 174–5. English summary 175.]

iii. STEINITZ, E. **Notes on a Cholera Epidemic in Burma.** *Ibid.* [In Hebrew 175–7. English summary 177.]

i. Measures taken by the Palestine authorities to limit the penetration of isolated cases of cholera from Egypt make the danger of the epidemic spreading to Palestine comparatively small. The author considers that the danger will increase at the end of the Egyptian epidemic when carriers may pass over the re-opened frontier. This eventuality must be met with the strictest measures to protect drinking water and food and the supervision of sanitation generally. It is considered that mass vaccination throughout Palestine would be premature, especially because of its uncertain and short-lived effects.

ii. The author discusses the theory and history of inoculation against cholera and points out that it is not analogous to anti-typhoid inoculation since the cholera vibrio " is not brought into direct contact with the blood serum."

In Palestine, at present, the inoculation consists of two weekly injections (0·5 and 1·0 cc.) of a heat-killed vaccine containing 2,000 million organisms per cc. Reactions are sometimes severe. Pain and oedema, where they occur, usually last for 48 hours and general reactions are quite frequently severe, comprising fever, nausea and vomiting, up to 72 hours. In about 10 per cent. of cases, there is transitory diarrhoea on the second day. It is made clear that preventive inoculation is only one of many preventive measures.

iii. A small cholera epidemic in Central Burma in August, 1945 is described. Infection was traced to the indiscriminate drinking of water by Indian and African troops on the shallow shore of the Irrawaddy. Where dehydration was marked, " colossal doses " of intravenous saline or glucose saline were given and relapses occurred if this fluid replacement was ceased prematurely. Milder cases were treated with sulphaguanidine. The author attributes the low death rate of 4 per cent. to immediate treatment, early inoculation and the probably low virulence of the vibrio. It is emphasized that effective treatment should always be given at the centre of an epidemic and that cholera patients should not be transported for long distances. *H. J. O'D. Burke-Gaffney*

SHRIVASTAVA, D. L. & WHITE, P. B. **Note on the Relationship of the so-called Ogawa and Inaba Types of** *V. cholerae.* *Indian J. Med. Res.* 1947, July, v. 35, No. 3, 117–29.

[An opinion might be hazarded that some bacteriologists, especially those not engaged on definite investigation, are none too satisfied with the validity of bacterial species generally. Statistically, experience illustrates the powerful influence of selection, technical selection ; the idea of transmutation seems to have something of the grip of a taboo when, to come closer to the subject in hand, one found how paracholera vibrios tended to increase in number proportionately to the patience of the worker. One wondered whether failure to produce a greater number " might have been reduced by more leisured and assiduous study ".] The authors have done great service to the controversy on the true cholera vibrio in declaring : (1) their finding of mixtures where dual serological types presented themselves in colonies ; (2) their belief in the possibility of races presenting " trivalent agglutinative properties " ; and (3) as a counter to a bacteriological stigma of complexity in taxonomy—their happier position " of urging a simplification of ideas." In short, they declare that " the

system of subsidiary classification of *V. cholerae* at present in vogue—and in the popularization of which one of us has played some part !—is, whatever may subsequently prove to be its practical importance, taxonomically invalid." The article must be read entire for its implications. Some of the summary may be quoted also :—

(1) " From 10 strains of *V. cholerae* and 3 strains of *V. El Tor* belonging to the Ogawa type and grown in the presence of Ogawa mono-specific antiserum, there were isolated in each case races serologically indistinguishable from strains of the Inaba type." (2) " When similarly exposed to the action of mono-specific Inaba antiserum, 4 of 8 strains of *V. cholerae*, predominantly Inaba-like in serology, but possessed of an imperfect Ogawa factor, yielded cultures of the Ogawa type." (3) " The existing classification of the vibrios of ' O ' group I into serological types is taxonomically invalid."

W. F. Harvey

BURROWS, W., ELLIOTT, Marian E. & HAVENS, Isabelle. **Studies on Immunity to Asiatic Cholera. IV. The Excretion of Coproantibody in Experimental Enteric Cholera in the Guinea Pig.** *J. Infect. Dis.* 1947, Nov.–Dec., v. 81, No. 3, 261–81, 9 figs. [12 refs.]

This is a fourth of a series of papers by BURROWS *et al.* [this *Bulletin*, 1947, v. 44, 422 ; 1948, v. 45, 178].

Provision is finally made by the authors for clear understanding of a difficult argument in a discussion, a summary and a series of conclusions. Distinctions are drawn between intoxication through dosage and real infection : serum- and copro-antibody ; local enteric and systemic infection ; effective and non-effective immunity ; secretion, excretion and leakage of immune body through the intestinal wall and permeability to antigen ; apparent diminution in number of faecal vibrios due to agglutination and real diminution due to establishment of copro-immunization ; diagnostic, prognostic and prophylactic implications, etc.

The original animal test of Koch, by means of young guineapigs and alkalinization, did not distinguish between toxaemia from overdose of the organisms and true establishment of infection. This has been declared capable of being a true infection by the authors, who show as much even as a 900 per cent. multiplication of vibrios within the gut. At first, the strains of vibrio obtained were highly virulent and capable of giving rise to a fatal infection in the guineapigs, but later it was no longer possible to produce real fatal infection. A non-fatal infection distinct from fatal toxaemia could, however, be produced and the guineapig faecal pattern test, with its similarity to human cholera infection, " provides a convenient tool for the study of this disease." The argument must be followed in all its detail. It was found, by quantitative studies, that :— (1) the infection was enteric and this was not invalidated, by ability to cultivate vibrios from the spleen, though they were found there only in $\frac{1}{3}$ to $\frac{1}{2}$ of the animals ; (2) non-fatal infection, originally fatal by inoculation of 25 mgm. (50,000 million vibrios), could be produced with as little as 7 mgm. of vibrios ; (3) " excretion of vibrios by the infected normal animal showed a characteristic pattern, the vibrios making up 40 per cent. to 90 per cent. of the total fecal flora in the two to four days after infection " ; (4) alteration of the pattern in animals with a prior non-fatal infection, or its equivalent of active parenterally produced immunity, showed " by sharp reduction in numbers excreted early in the infection to 10 per cent. to 20 per cent. of the total fecal flora and a reduction in time of persistence of infection ". The alteration did not occur in lethal infections, where the percentage remained at 90 per cent. or higher ; (5) agglutinating and protective antibody, but not bacteriophage, could be demonstrated

in faecal fluid obtained by centrifuging and filtering through coarse paper. This antibody was called coproantibody and seems to have been identical with serum antibody, although the mechanism by which it appears in the bowel and " contributes to immunity to enteric infection is not apparent from the reported experiments " ; (6) the coproantibody appeared early even before the peak of serum antibody and disappeared in 3 to 4 weeks although serum antibody persisted ; (7) an immunity-faecal pattern was presented when " vibrio excretion was associated with the presence of coproantibody at the time of infection " and the reduction of vibrio numbers was real. *W. F. Harvey*

MONTHLY BULL. MINISTRY OF HEALTH & PUB. HEALTH LAB. SERVICE (DIRECTED BY MED. RES. COUNCIL). 1947, Dec., v. 6, 225–9. **Bacteriological Examination of Stools for** *Vibrio cholerae*.

Laboratory workers in Great Britain will at least have to be prepared to recognize the true cholera vibrio, in view of the possible introduction of the disease. Chronic carriers probably do not occur and the vibrio is not usually demonstrable for more than five days after onset. Attention will therefore be paid to the possibility of arrival of a patient suffering from the disease or a transitory healthy carrier who may possibly be in the incubation stage. Stools should be examined early and, if delay occur, should be suspended in the borate-saline mixture of VENKATRAMAN and RAMAKRISHNAN [this *Bulletin*, 1942, v. 39, 458]. Direct cultivation is recommended on desoxycholate citrate agar and Aronson's medium, while Read's bismuth-sulphite modification of Wilson and Blair's medium may be used for enrichment. An inoculation intraperitoneally of a loopful of an 18-hour peptone-water culture of the recently isolated vibrio should kill a young guineapig in 24 hours, which distinguishes it from the non-cholera vibrios, except *V. metchnikovi* and the El Tor vibrio. No organism from a sporadic case of cholera in Great Britain should be identified as a cholera vibrio unless it is morphologically and culturally typical, falls into Heiberg's fermentative Group I, is cholera-red positive and Voges-Proskauer negative, fails to form a soluble haemolysin for sheep or goat red blood corpuscles and is agglutinated by an antiserum prepared against the specific O sub-group I of Gardner and Venkatraman. *W. F. Harvey*

ADISESHAN, R., PANDIT, C. G. & VENKATRAMAN, K. V. **Statistical Evaluation of Anti-Cholera Inoculation as a Personal Prophylactic against Cholera and its Efficacy in the Prevention and Control of Cholera Epidemics.** *Indian J. Med. Res.* 1947, July, v. 35, No. 3, 131–52, 1 map & 1 graph.

As is the case with many, if not most, prophylactic field operations there is, statistically, the question of selection to be considered in assessment of the value of the data presented. There " appear to be doubts about the effective exposure to the disease being identical in the case of the inoculated and uninoculated populations." Other considerations may cause difficulty in getting material for study, even though total numbers may be large. Here for example the " inquiry was contemplated only after thousands of inoculations had already been done ", and the test epidemic had become widespread. The vaccine used " was almost invariably administered in a single dose . . . 1 cc. of vaccine containing 8000 million vibrios ". The data required are (1) those pertaining to anticipatory inoculation, which was taken to be inoculation done during the first outbreak in a village " with respect to the second and subsequent outbreaks " ; (2) the duration of the immunity conferred by inoculation ; (3) the influence of mass immunity on the occurrence of subsequent outbreaks. The investigation relates to rural areas only and the units were villages and

hamlets. A full statistical analysis has been carried out relating to 1·18 million persons in 2,350 villages who were inoculated with a vaccine containing both Inaba and Ogawa types of cholera vibrio. Altogether, in this very large-scale operation, some 12½ million persons were inoculated. Of these there were recorded " 1,118 cases of cholera amongst 709,977 protected persons in the inoculated population and 34,336 cases of cholera in 2,119,568 uninoculated persons. . . . Two or more outbreaks of cholera occurred in 627 out of 2,350 villages. . . . In the second and subsequent outbreaks 6,580 cases of cholera occurred in the uninoculated group and 241 in the ' protected ' group . . . that is, the incidence in the uninoculated was 14·2 times greater than in the protected group ". The other answers to the questions originally posed are that " the immunity conferred by anti-cholera inoculation lasts for a minimum period of six months and probably remains effective up to 12 months ", and " Herd immunity seems to play an important part in preventing multiple outbreaks in a locality during an epidemic ". *W. F. Harvey*

CHANDRA SEKAR, C. **Statistical Assessment of the Efficacy of Anti-Cholera Inoculation from the Data of 63 *Cheris* in South Arcot District.** *Indian J. Med. Res.* 1947, July, v. 35, No. 3, 153–70, 3 figs. Appendix 171–6.

Evidently the data collected by ADISESHAN, PANDIT and VENKATRAMAN [see previous abstract] were not wholly satisfying and an endeavour is made by the present author to analyse the facts for a more homogeneous population. For this he uses a smaller unit, the *Cheri*, than the village or hamlet. It is a compact block, inhabited by the " depressed classes ", who are of the same social status, live close together, use the same water supply and eat the same food. Attention was concentrated on one district only and the definition, as before, of a second outbreak was : " one which took place at least 30 days after the first ". The result of this more searching statistical analysis seems to have been a reduction in the difference exhibited by inoculated and uninoculated. " The attack rate in the ' not inoculated ' population was found to be 2–4 times that in the ' inoculated ' population. Statistical test indicated that inoculation afforded protection against the disease and was useful as a personal prophylactic ". Although " the average resistance of the population was increased by inoculation . . . there was no significant difference between the case fatality rates amongst those attacked in the ' inoculated ' and ' not inoculated ' populations ". *W. F. Harvey*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

BLUMENTHAL, H. T., DUTRA, F. N., PASCHAL, H. & KUHN, L. R. **The Significance of *Endameba histolytica* in Stools of Individuals with Acute Diarrhea of Moderate Severity.** *Amer. J. Trop. Med.* 1947, Nov., v. 27, No. 6, 711–21. [21 refs.]

This paper is founded on data obtained in American troops in India. In those stationed in the Calcutta area, the incidence of amoebiasis was almost 20 per cent., but in those in the New Delhi area it was much lower—about 5 per cent. Furthermore, the data obtained showed an incidence of 20 per cent. in those who had no symptoms of diarrhoea and 31·5 per cent. in those who had. On the other hand, bacteriological studies of the stools of patients with diarrhoea of moderate severity showed a most striking similarity whether *E. histolytica* was present or not. The bacteriological findings were similar in Calcutta and

New Delhi, despite the difference in the incidence of amoebiasis. It is concluded that these moderately severe diarrhoeas are not necessarily amoebic in origin and that the incidence of amoebiasis of 20 per cent. is probably coincidental. It is also suggested that pathogenic bacteria, and those that may possibly be so, may play an important role in determining a person's resistance to amoebic infection and may also constitute an accessory factor in determining the power of penetration through the intestinal mucosa by *Entamoeba histolytica*.

P. Manson-Bahr

BOSTICK, W., JOHNSTONE, H. G. & ANDERSON, H. H. **Amebiasis—Pathology, Diagnosis, and Recent Developments in Therapy.** Reprinted from *California Med.* 1947, Oct., v. 67, No. 4, 4 pp.

SCHUUR, T. E. Bijzondere vorm van coecale amoebiasis. [**An Unusual Form of Caecal Amoebiasis.**] *Med. Maandblad.* Batavia. 1947, Nov., No. 16, 306.

BINGHAM, J. A. W. **Perforation of the Colon in Dysentery. Two Cases of Recovery after Operation.** *Lancet.* 1948, Jan. 24, 139–40.

" Two cases of perforation in dysentery recovered after operation ; one was an amoebic case, treated by colectomy, and the other a Flexner's bacillus infection treated by drainage of a pelvic abscess."

BOCK, H.-E. Lebervergrösserung bei oder infolge Lambliosis und Amöbiasis. (Zugleich ein Beitrag zur Frage der parasitär-enterogenen Hepatopathie und der Amöbenhepatitis.) [**Liver Enlargement from either Giardiasis or Amoebiasis.**] *Klin. Woch.* 1947, Mar. 1, v. 24–25, Nos. 21/22, 331–7, 5 figs. [24 refs.]

In this rather discursive communication it is difficult to distinguish the main object. There appears to have been some doubt in the minds of German diagnosticians between the hepatomegaly of infective and amoebic hepatitis. As Giardia cysts were found in 8 per cent. and *E. histolytica* in 6·5 per cent. of the cases of liver enlargement considered, it was possible that in some there was a double infection.

The author claims that the early stages of amoebic hepatitis can be recognized by a positive Takata reaction as well as by vacuolation of the hepatic cells in material obtained by liver puncture. Additional evidence is afforded by increased blood sedimentation rate, leucocytosis with a shift of the Arneth index to the left, in addition to hepatomegaly.

Response to the therapeutic action of emetine is very suggestive of the diagnosis of hepatic amoebiasis, but apparent cure may be deceptive, and abscess formation may occur after it. Three instances are recorded in which, after apparent satisfactory response to emetine therapy, all ascertainable signs and symptoms (with the exception of a positive Takata reaction) disappeared and yet an abscess cavity was proved to exist by hepatic aspiration.

P. Manson-Bahr

BANKER, D. D. **Amoebic Abscess of the Liver.** *Indian Physician.* 1947, Nov., v. 6, No. 11, 254–62.

This paper comprises a study of 130 cases of amoebic abscess of the liver seen during a period of ten years up to December 1944, and 66 cases diagnosed at autopsy. Making allowances for 12, which were included in both series, a grand

total of 184 cases is obtained. Only those have been included in which confirmatory evidence was obtainable by the demonstration of typical liver abscess pus. Approximately one case in every 1,000 admitted to the K.E.M. Hospital in Bombay turned out to be a liver abscess.

Once more a marked preponderance of the disease in the male is evident. Of the 130 patients, 97·7 per cent. were males, and this is in accordance with the observations of workers elsewhere. In the present series there is no record of cases in infancy or childhood. On the other hand, the minimum age was 18 and the maximum 62, and the maximum incidence lies between the ages of 30 and 50 years. The greatest incidence was amongst the poor labouring classes.

Previous attacks of " dysentery " were recorded in 40 per cent. In 3 per cent. only did dysenteric symptoms coincide with liver abscess ; in the great majority, the interval between them was from 2 months to 5 years. It was not possible to record previous attacks of amoebic hepatitis. Pain in the right hypochondrium was present in 65 per cent. of cases and the most prominent symptoms were pain and swelling in the same area. Shoulder pain, ocular icterus and persistent hiccough were exceptional. The commonest sign was tenderness in the right hypochondrium in 95 per cent. Enlargement of the liver was verified in 83 per cent.

Radiological screening of the diaphragm was carried out in 27 and raising of the right dome and immobility was demonstrated in all. In one only was a central circular dense area suggestive of an abscess cavity demonstrated. In 86 per cent. the leucocyte count was above 10,000 per cmm.

As regards the abscess contents in 78 per cent. the pus was typically chocolate-coloured and in the remainder brownish yellow. Trophozoites of *E. histolytica* were seen on two occasions only.

Two chief lines of treatment were carried out. (1) One or more aspirations combined with emetine injections. In all, 75 cases were thus treated and in 30 aspiration had to be repeated. (2) Incision and drainage combined with emetine injections were carried out in 32. In 27 cases the approach was trans-thoracic with rib resection ; in the remainder it was trans-abdominal The case mortality for all treatments was 29 per cent., but for aspiration and emetine it was 13·3 per cent. Where the abscess had perforated the mortality was higher—in 14 such cases, 10 proved fatal. After open operation in 32 cases there were 9 fatalities.

Relapses were recorded in 6 per cent.

Complications. Perforation was most frequent and was fatal in 71 per cent. of cases [already shown as 10 out of 14].

Perforation into the right lung occurred in three, two of which healed spontaneously. Into the peritoneal cavity there were four of which three proved fatal. There were 4 perforations into right pleural cavity (three fatal) and one fatal perforation involving peritoneal and right pleural cavities together. Perforation of the abdominal wall occurred in two cases, both of which were fatal.

In six cases, secondary infecting organisms were isolated.

In 22 cases out of 66 at autopsy more than three abscesses were seen in each ; in the remaining 34 (52 per cent.) the abscess was solitary.

The largest abscess was 18 cm. in diameter ; four of them were small, being less than 1 cm.

Concurrent amoebic ulcers in the large intestine were found in 51 cases at autopsy ; in the other 15 no such lesions were seen.

In 24 cases, the whole of the large intestine was involved : the caecum alone, the caecum and ascending colon and the ascending colon alone were each involved 8 times, and the pelvic colon and rectum three times. Concurrent

ulcers were more common in the proximal portion of the intestine and this coincides with the universally held view that amoebic liver abscess is more likely to occur in the right than in the left lobe. The cause of death ascertained at autopsy was perforation in 21 cases ; extensive destruction of the liver in 14 ; perforation of amoebic ulcer in the intestine in 6 ; secondary lobar or bronchopneumonia in 6 ; and active pulmonary tuberculosis in 4. *P. Manson-Bahr*

RESTREPO, R. & MÉNDEZ LEMAITRE, A. Infecciones amibianas confundidas con cáncer. Amibíasis del cuello uterino y vagina diagnosticada como cáncer uterino avanzado. Amibíasis de la vulva. [**Amoebic Infection confused with Cancer of the Cervix Uteri and the Vulva.**] *Rev. Facul. de Med.* Bogota. 1947, Sept., v. 16, No. 3, 914–20, 4 figs.

AMADOR, M. Uremia extrarrenal causada por *Endamoeba histolytica*. [**Extrarenal Uraemia due to** *Entamoeba histolytica*.] *Medicina*. Mexico. 1947, Nov. 25, v. 27, No. 544, 515–21. [19 refs.]

Much of this article is taken up with redundancies, recording matters generally known, such as the physiology of protein metabolism, the function of the liver in the formation of urea, the history of *E. histolytica* and its cultivation, Craig's recording of the presence of nephritis in fatal cases of amoebic dysentery in the Philippines in 1904. Apart from all this, the author's thesis appears to be that *E. histolytica* needs an alkaline *p*H, and NaCl for its development in the body, that, living in the large intestine, the parasite is subjected to a varying *p*H according to the food taken and the intestinal flora, that a meat diet renders the faeces alkaline and so facilitates the metabolism of the amoeba, and that increased call is made on the liver to exercise its rôle of detoxicant.

In a case detailed the patient had been dieting for 12 years on account of supposed renal disease and a threatened uraemic state. His blood urea was 40 mgm. and had been 75 mgm. and a diet practically meatless had little effect on it ; chlorides in the blood were below normal. Cysts of *E. histolytica* were found in the faeces : he was given specific treatment with carvarsone and later was eating meat daily. The blood urea fell to 23·07 mgm. and his blood pressure from 210/110 to 150/90.

The author concludes that the "hyperazotaemia in chronic amoebiasis results from preceding deficiency of chloride" and is not the result of disturbance of renal function or pathological changes in the kidneys.

H. Harold Scott

BENHAMOU, E., ALBOU, A. & LEONARDON, H. A propos du traitement de l'amibiase intestinale par l'association pénicilline-sulfaguanidine-émétine. [**Treatment of Amoebic Dysentery with a Combination of Penicillin, Sulphaguanidine and Emetine.**] *Algérie Méd.* 1947, Oct., v. 50, No. 8, 608–11.

The authors refer to the work of HARGREAVES [this *Bulletin*, 1945, v. 42, 895] and BLANC and SIGUIER [*ibid.*, 1947, v. 44, 524] on the treatment of intestinal amoebiasis with penicillin and sulphonamides, in addition to emetine, as a means of combating secondary infection.

They themselves have used this type of combined treatment for 3 patients in Algiers, with very satisfactory immediate results.

One patient suffered from amoebic dysentery only : the other two had, in addition, bacillary dysentery and *P. falciparum* malaria respectively.

Varying combinations of the drugs were given over periods of 4 to 7 days : these included from 1 to 2 million units of penicillin, from 80 to 100 gm. of sulphaguanidine, and either 0·32 to 0·56 gm. of emetine or 4 to 5 gm. of stovarsol.

The authors note that the cases of Blanc and Siguier were all severe, of a type seen in tropical climates : in Algeria, on the other hand, mixed infections are not usually severe and amoebiasis responds to classical treatment : it is therefore suggested that the value of a new method in these cases must be assessed on the long-range prognosis, rather than on immediate results, particularly in relation to relapses. This must take into account the "*notion de terrain et de milieu*", since persons living continuously in a tropical environment where they are constantly exposed to amoebic re-infestations and secondary infections may have little chance of permanent cure : these factors do not operate in Algeria, so that, with appropriately adjusted dosages, it may be that something more effective and permanent than the classical treatment may be found in the use of synergic methods. *H. J. O'D. Burke-Gaffney*

GROSS, S. J. **Treatment of Amoebic Dysentery with E.B.I. Retention Enemas.** *Indian Med. Gaz.* 1947, Aug., v. 82, No. 8, 452–5.

"Amoebiasis is an infection which is localized mainly in the colon and in the rectum. Therefore, local treatment by topical application of medicines is indicated. Treatment by means of small retention enemas containing E.B.I. is suggested. The results of 64 cases treated with this method are reported."

HAMMEL, L. Dysentérie amibienne histolytica et Kystes guéries en 2 jours par 2 applications, par voie buccale, d'une composition de novarsénobenzol. Publication préliminaire. [**Oral Treatment of Amoebic Dysentery in Two Days with Novarsenobenzol.**] *J. Roy. Egyptian Med. Ass.* 1947, Sept., v. 30, No. 9, 429–39.

The author says he had amoebic dysentery in 1944. He cured himself by taking Novarsenobenzol orally for two days. He details his reactions to his treatment, but does not state the dosage he employed nor the nature of the substances he added to "detoxicate" the drug. He similarly treated fifteen other cases of the disease for two days, fourteen of them, he says, successfully. He hopes to obtain cure with a single dose of his preparation. *A. R. D. Adams*

BASNUEVO, J. G. & SOTOLONGO, F. Cloroquina y acetoxifenil, en el tratamiento de la giardiasis infantil. [**Chloroquine and Aceto-Xifenil in the Treatment of Giardiasis in Children.**] *Kuba.* Habana. 1947, Nov., v. 3, No. 11, 245–9. [19 refs.] English summary.

[See also this *Bulletin*, 1947, v. 44, 585, 663.]

KUPKA, E. & NOTHHACKSBERGER, W. Ein Fall von *Balantidium minutum* (Schaudinn). [**A Case of Infection with** *Balantidium minutum.*] *Wien. Klin. Woch.* 1947, Dec. 5, v. 59, No. 48, 800, 2 figs.

The case described is that of a woman 56 years of age who fell ill with dysentery which was treated as ulcerative colitis. After two months' illness, a stool examination revealed a ciliate which was identified as *Balantidium minutum* The patient was treated with injections of quinine in 1 per cent. solution and with yatren. A subsequent examination revealed no ciliates. The ciliate is well described in the paper and is illustrated by two figures. Numerous division forms were present and the ciliate was still alive after six days at laboratory temperature. [This description, and particularly the figures, show clearly that the organism is not a species of *Balantidium* but is undoubtedly *Balantiophorus minutus*, which WATSON [this *Bulletin*, 1946, v. 43, 382] has shown to be the coprozoic ciliate repeatedly described as *Balantidium minutum.*]

C. M. Wenyon

RELAPSING FEVER AND OTHER SPIROCHAETOSES

CHORINE, V. & COLAS-BELCOUR, J. Perte du pouvoir infectant des cultures de *Spirochaeta hispanica* pour l'*Ornithodorus erraticus*, son vecteur dans la nature. [**The Loss of Infectivity of Cultures of** *Spirochaeta hispanica*, **for** *Ornithodorus erraticus*, **its Natural Vector.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 9/10, 383–8. [11 refs.]

The study of cultures of *S. hispanica* has shown that there is a gradual diminution in virulence as the number of passages increases, but this diminution is less evident in rodents than in human subjects. Even after 80 passages, 0·01 cc. of a culture will infect a guineapig, although the incubation period is increased from 2 to 14 days and the resulting infection is benign.

Various lots of *Ornithodorus erraticus* were fed through artificial membrane on suspensions of the culture spirochaetes and after varying intervals allowed to feed on normal guineapigs. In addition, ticks were ground up and inoculated into other guineapigs. The results were uniformly negative, neither infection nor immunity being shown by any of the animals. Finally ticks were fed on rabbits that had been inoculated intravenously with 75 cc. of a rich culture of spirochaetes, immediately before the experiments. These ticks also gave negative results when tested for infectivity.

The results show that in culture *S. hispanica* loses its infectivity for the transmitting host before its power of infecting vertebrate hosts. The authors consider that this resembles the loss of infectivity to the transmitting host shown by certain strains of Protozoa that have been maintained artificially in the laboratory by passage in the vertebrate host without the intervention of any arthropod vector. Various trypanosomes after a certain number of passages lose their infectivity for *Glossina*; certain strains of *Plasmodium vivax*, after being maintained for some years by inoculation from one human patient to another, lose their power of developing in *Anopheles*; finally, *Theileria dispar*, after passage in bovines for 6 years will no longer develop in the intermediate host *Hyalomma mauritanicum*. *E. Hindle*

DECROP. Typhus récurrent et rougeole. [**Relapsing Fever and Measles.**] *Cahiers Méd. Union Française.* Algiers. 1947, June, v. 2, No. 11, 457.

Report of a case.

JEPSON, W. F. **Economic Control of the Relapsing Fever Tick in African Houses.** [Correspondence.] *Nature.* 1947, Dec. 20, 874.

Ornithodorus moubata is alarmingly abundant in many townships and labour camps in East Africa: it is markedly resistant to the common insecticides and its control has hitherto proved uneconomic.

The author, who is an entomologist in the Tanganyika Territory Agricultural Department, has been impressed with the outstanding toxicity of hexachlorocyclohexane to *O. moubata* and has had very promising results in practical trials with a number of Gammexane formulations.

In laboratory tests, the lightest dusting of individual ticks with 0·5 per cent. Gammexane caused them to lose co-ordination of leg movements in 4 to 6 hours, and to lose up to 10 per cent. of body weight in 24 hours by loss of fluids. Immobility, apart from feeble but persistent leg movements, occurred in 12 hours to 5 days, according to age; and 80 to 100 per cent. mortalities resulted in 8 to 10 days. Adult ticks, especially gravid females, showed leg movements up to 2 months after treatment, but all eggs laid failed to hatch.

Dusting with 5 per cent. DDT is slower and less effective, but mortalities of 50 to 80 per cent. were obtained after more than 20 days.

In the field, 0·5 per cent. Gammexane dust was most economic when applied, with a simple shaker such as a round tin, to the floors and first few inches of the walls of infested houses; the application was made at 3 to 4 lb. of dust per 1,000 sq. ft. of surface. Results were checked by five "boys" who searched the floors to a depth of 1½ inches at random for 5 minutes. In this way, infestation in a labour transit camp was reduced from an average of 20 per unit sample to less than 0·2 over a period of nine months; after this period, further treatment was necessary, possibly because of regular re-infestation from transit labourers. When the commercial dust concentrate (2·5 per cent. Gammexane) was diluted with a local diluent (preferably a light diatomaceous earth, "Diatomite"), the cost of the material was about 4·5 pence per lb. which is well within the economic range for large-scale use.

Extended experiments have been started in a whole township of about 1,200 houses: half of them are infested with *O. moubata*, with a consequent high incidence of relapsing fever: the reduction of ticks is already appreciated, although it will be some time before the relapsing fever statistics can be assessed.

It is added that this treatment has been officially standardized in several Government departments in Tanganyika as an advance on any previous control measures [see also this *Bulletin*, 1947, v. 44, 1070].

H. J. O'D. Burke-Gaffney

LING, C. C. **A Preliminary Study of the Treatment of Chinese Louse-borne Relapsing Fever with Penicillin.** *Chinese Med. J.* Shanghai. 1947, July–Aug., v. 65, Nos. 7/8, 225–30. [10 refs.]

"A preliminary study of two cases of Chinese louse-borne relapsing fever treated with penicillin was made. It was found that penicillin given late in the paroxysm did not shorten the duration of the paroxysm, but prevented relapse and effected cure. When penicillin was administered on the first day of paroxysm, a rapid induced crisis resulted. The arbitrary doses employed were 960,000 and 1,780,000 units, and both were found to be adequate to eradicate the infection. The indications of penicillin therapy in relapsing fever are briefly outlined."

YAWS

ARJE, S. L. **Yaws treated with Single Massive Doses of Penicillin.** *U.S. Nav. Med. Bull.* 1947, Nov.–Dec., v. 47, No. 6, 965–9, 3 figs.

In islands outside the Truk atol, between October 1946 and June 1947, some 5,000 cases of yaws were treated with a single injection of penicillin. At first 200,000 units of sodium penicillin in 4 cc. of sterile water was used, but later this was replaced by 300,000 units of calcium penicillin in 1 cc. of beeswax and arachis oil. Cases were observed at intervals of 1–2 monthly for 9 months.

The total numbers of new cases and clinically active yaws were reduced; the typical secondary skin lesions were reduced to a greater extent than plantar granulomatous yaws.

This treatment was in use until adequate trained staff became available; but inadequate cold storage facilities then caused penicillin to be replaced by "mapharsen". [No serological data are reported.] *C. J. Hackett*

GUIMARÃES, F. N. Pesquisas sobre a imunidade da Framboesia tropica no homem. Observações feitas em 33 superinoculações e 7 reinoculações. [**Immunity in Yaws : Studies of 33 Superinoculations and 7 Reinoculations.**] *Mem. Inst. Oswaldo Cruz.* 1946, Dec., v. 44, No. 4, 649–85, 6 figs. & 10 pls. English summary.

This study is based upon superinoculations in 33 Wassermann-positive yaws patients and reinoculations in 7 Wassermann-negative treated yaws patients.

From 2–8 months after infection, attempts at superinoculation with yaws spirochaetes were usually unsuccessful. This was independent of the presence of primary or secondary skin lesions. Treatment during this period abolished this immunity.

From 10–48 months the resistance to superinfection decreased and localized lesions resembling non-granulomatous secondary skin yaws, pianides or desquamating papular areas resulted, without generalized lesions, for at least 4 months later. This response seemed to be independent of the presence of active yaws and is not altered by treatment resulting in clinical cure and negative Wassermann reactions.

After the 5th year, superinfection caused a necrotic ulcer together with an exacerbation of any other lesions present [tertiary gummatous in most of the cases studied] and swelling of satellite glands. No generalized lesions followed (in one case after 18 months). Treatment had no effect on the response. Three patients with tertiary gummatous lesions, but with yaws of less than three years' duration, did not give this response. These necrotic lesions contained only few treponemata. Their histopathology was similar to that of tertiary yaws. [In these cases the incubation period of inoculation lesions was shorter than in the previous group, 8–10 days against 20–30 days.]

Epidemiologically, it is advisable to wait until the end of the generalized secondary stage of yaws before beginning treatment, since reinfection is possible; but from a preventive point of view, early treatment to reduce the source of infection is essential.

In yaws there is a true immunity, since the response to reinfection is unaltered by treatment. This immunity is manifested by resistance or modified response to superinoculation or absence of generalization. These different immunity states may condition the different manifestations of yaws. In yaws, immunity is related to age of infection, the virulence of the organism and the individual characteristics of the patient.

[These findings are interesting and might usefully be extended.]

C. J. Hackett

LEPROSY

DE SOUZA-ARAUJO, H. C. & ROSSELL, C. S. C. Isolamento de bacilos ácido-alcool resistentes das aguas dos efluentes das fossas " OMS " do Sanatorio Padre Bento (S. Paulo) e do Hospital-Colônia Curupaity (Distrito Federal). [**Isolation of Acid-Alcohol-fast Bacilli from the Effluents of a Sanatorium in São Paulo and a Hospital in the Federal District.**] *Mem. Inst. Oswaldo Cruz.* 1946, Dec., v. 44, No. 4, 763–71, 3 figs.

The authors obtained samples from the drainage effluents of the Leprosarium Padre Bento, São Paulo, and the Curupaity Hospital, Distrito Federal. The samples had been collected in sterile tubes ; they were centrifuged, the deposits treated by the Petroff method ; the product was again thrice centrifuged, the

deposit washed and sown on Loewenstein's medium. Smears of the deposit showed bacilli which were acid- and alcohol-fast. Several weeks later, growth was obtained which appeared to be identical with those which have been described as having been isolated from leprous material. In an addendum, Dr. Rossell records isolating the same (or a similar) organism from the effluent of another leprosarium in South Minas [see this *Bulletin*, 1945, v. 42, 566, 1006].

H. Harold Scott

IGNACIO CHALA H., J. Comentarios sobre clasificación de la lepra. Manifestaciones dermatológicas y nerviosas del tipo tuberculoide. [**Remarks on the Classification of Leprosy. Cutaneous and Nervous Manifestations of the Tuberculoid Form.**] Reprinted from *An. Soc. Biol. Bogotá.* 1947, May, v. 2, No. 6, 216–28, 8 figs.

The author discusses the validity of the classification of cases of leprosy into lepromatous, tuberculoid and non-characteristic. He describes the division of the tuberculoid type (as recommended at the Cairo Congress in 1938) into the reactional and the quiescent and describes each fully. The "non-characteristic" cannot be, at all events ought not to be, considered a type in the same sense as either of the others. The lepromatous patient, however, free from clinical symptoms, always harbours the bacillus in the lymph of the glands and is, therefore, a danger to the public and should never reach the class of the socially cured allowed out on parole.

Among 513 patients studied, 48 (9·35 per cent.) were of the tuberculoid type 206 (40·1) lepromatous, and 259 (50·5) non-characteristic. The author regards, the last as undergoing an evolution stage of the disease which cannot be looked upon as a form or type of leprosy as it may evolve into one or other definite type. By examination for Hansen's bacilli and by testing the Mitsuda reaction at intervals such patients can in time be relegated, he maintains, to their proper category. In the true tuberculoid type, the reaction is strongly positive, in the true lepromatous definitely negative; in the non-characteristic it varies and may be negative or weakly positive.

H. Harold Scott

MONTESTRUC, E. & CAUBET, P. Aïnhum lépreux localisé au cinquième doigt. [**Ainhum of the Little Finger in a Patient with Leprosy.**] *Cahiers Méd. Union Française.* Algiers. 1947, Nov., v. 2, No. 14, 667, 1 fig.

THIROUX and DELAMARRE are mentioned as having observed ainhum and leprosy co-existing in the same patient [no reference is given]. A photograph reproduced in the present note shows leprous mutilations of the fingers of both hands and ainhum of the right little finger. The authors state definitely that "it is impossible, in this case, not to ascribe the ainhum as due to leprosy", but in another place state more guardedly "leprosy may not always take part in the production of lesions like this" and conclude that ainhum, goundou and perforating ulcer of the sole are not due to one single cause, but have a mixed aetiology.

H. Harold Scott

MONTESTRUC, E. & RAGUSIN. Le goundou lépreux. Considérations étiologiques sur le goundou. [**The Aetiology of Goundou; Leprosy as a Cause.**] *Cahiers Méd. Union Française.* Algiers. 1947, Nov., v. 2, No. 14, 665–6.

Authors are by no means unanimous in ascribing goundou to yaws; some say they see no cases in places where yaws is common and others report cases as rare in highly endemic yaws districts. The present authors record a case in Martinique. The patient, a woman 27 years of age, was suffering from leprosy

and showed typical goundou nasal tumours. Hansen's bacilli were present in the nasal mucosa and in biopsy material of a tubercle ; the W.R. was negative and no history indicative of yaws was obtainable.

They quote HIRSCHBERG and BIEHLER [but do not give the references] as having published an important work on osseous leprosy and say that the former mentions bony lesions of the upper jaw and of the bones of the nose. They also mention HERIVAUX as having shown to the Medical Society of Madagascar in 1930 a patient suffering from mixed leprosy, with goundou-like tumours on each side of the nose, which he called *pseudo-goundou*, and added that the patient was " free from yaws ". *H. Harold Scott*

DE SOUZA-ARAUJO, H. C. Acção bacteriostática da " Tyrothricin " em relação às culturas de bacilos ácido-álcool resistentes isolados de leprosos, e sua ineficacia como agente terapêutico da lepra humana. [**Action of Tyrothricin on Cultures of Bacilli isolated from Leprosy Patients and its Use in Treatment of Human Leprosy.**] *Mem. Inst. Oswaldo Cruz.* 1946, Dec., v. 44, No. 4, 749–61, 2 figs.

Tyrothricin, a mixture of gramicidin and tyrocidin obtained from cultures of *Bacillus brevis*, a sporing aerobic saprophytic Gram-positive organism, has been recommended as an antibiotic, bacteriostatic and bacteriolytic, like penicillin. The author obtained a 1 per cent. solution of it in 95 per cent. alcohol and prepared numerous dilutions from it in glycerinated broth. He then set up a series of tubes, inoculated them with various cultures of acid-fast bacilli isolated from leprosy patients or insects which had been fed on them, and found it to be bacteriostatic in dilutions of 1 : 8,000 and 1 : 16,000 with different bacteria. He then proceeded to try it, intradermally injected, in cases of leprosy, and four cases are reported in considerable detail day by day. Only the general results can be recorded here ; for those interested a study of these details should prove very informative. Tyrothricin proved to be a marked local irritant, but it increased phagocytosis and local reaction was marked ; there was some systemic disturbance and the patient might say that it made him feel ill and he would ask to have the treatment changed. In spite of its action *in vitro*, it had no curative action in these patients and did not prevent the development of fresh lepromata and macules later, nor did it bring about any regression of the disease. *H. Harold Scott*

HELMINTHIASIS

MEIRA, J. A. Esquistosomiase Mansoni. Subsidio ao estudo de sua incidência e distribuição geográfica no Brasil. Lista bibliogrâfica *brasileira sôbre a esquistosomose* mansoni (doença de Manson-Pirajá da Silva). [**Schistosomiasis Mansoni. Helps to the Study of its Incidence and Geographical Distribution in Brazil, with a Bibliography.**] Reprinted from *Arquivos Facul. de Hig. e Saude Publica, Univ. de São Paulo.* 1947, June, v. 1, No. 1, 146 pp. [Bibliography.]

This full and painstaking account of Schistosomiasis mansoni in Brazil drives home the fact that the infestation is very widespread, is of great economic as well as of medical importance and calls urgently for more intensive measures of control. The work is divided into three main parts. The first, of an introductory nature, points out in more or less general terms the gravity of the problem, the unsatisfactoriness or inaccuracy of the returns hitherto regarding prevalence, and the almost universal (that is, in Brazil) presence of species of

Australorbis, the chief snail host. In this section, the prevalence in the different States is hinted at ; the detailed accounts of each of 21 States occupies part II, which constitutes the greater portion of this work. Other hosts than *Australorbis glabratus* (*Planorbis centimetralis*) are *P. guadaloupensis* and *P. olivaceus*, a considerable percentage of which are found to harbour cercariae ; in Ceará, for example, 17·9 per cent. of 307 examined.

Space forbids our recording here the findings in the different States, but as an example we may deal more fully with Pernambuco, to which several pages in the work are devoted. Viscerotomy specimens were obtained from 5,202 persons in 40 localities, and 763 (14·6 per cent.) were positive. The percentages varied greatly ; in Jardim and Duarte Dias none was found, but only small numbers, 17 and 35 respectively, were examined ; in Palmares the positives were 35·9 per cent. of 114. Pontezinha, near the river Jaboalão, has a population of 1,200 ; 1,010 of these had their faeces examined, once only, and the percentage incidence by age [actual numbers are not stated] was : under 5 years 2·7 ; 6–10 years 12·1 ; 11–15 years 30·8 ; 16–20 years 37·8 ; 21–30 years 30·7 ; 31–45 years 24·8 ; over 46 years 16·6. In Vitória, the figures were even higher. In all, 1,530 individuals were examined out of a population of 15,000 and ova were found in the faeces of 593 (38·6 per cent.) ; doubtless more would have been found positive had more than a single examination been made. The percentages by age in this district were : under 5 years 21·9 ; 6–10 years 45·4 ; 11–15 years 56·9 ; 16–20 years 52·9 ; 21–30 years 48·7 ; 31–45 years 30·5 ; over 46 years 25·0. Other helminthic infestations were common. *Ascaris lumbricoides* was found in 82 per cent. of 1,151 examined, *Necator americanus* in 30 per cent. of 421, and *Trichuris trichiura* in 24·3 per cent. of 342. All these figures are taken from published papers and the author has a running comment on them.

According to the data investigated by the author, it has been estimated that there are nearly three million persons infested with *S. mansoni* in Brazil, but the author himself believes this to be a gross underestimate, as in the Northern States and Minas Geraes—highly endemic foci, it is true—nearly 2 million (1,817,892) have been found to be infested.

The bibliography is confined to papers published in Brazil and includes more than 350 references. [The whole work is full of interesting information and should prove useful in a few years time for gauging the results of measures undertaken to remedy the conditions now present.] *H. Harold Scott*

PORTELA, B. Considerações sobre a esquistosomose. [**Schistosomiasis mansoni (in Pedra Azul, Brazil).**] *Brasil-Medico*. 1947, Oct. 4 & 11, v. 61, Nos. 40/41, 352–6.

Infestation with *Schistosomiasis mansoni* is very common in this district. The author states that among 2,000 samples of faeces 1,280 contained the ova. From these 2,000 there should be deducted 200, as the specimens were from children under 2 years of age which were being examined for other parasites, notably *Giardia intestinalis*, and 300 others were repeat examinations. Thus, of 1,500 there were 1,280 (85·3 per cent.) positive, and the author says that in certain districts careful examination, systematically carried out, would show that nearly all were infested. He gives short histories of 11 patients whose ages ranged between 5 and 70 years (the one aged 70 died), but they were all fairly typical. The treatment adopted was by tartar emetic, 1–2 per cent. solution freshly prepared and diluted with hypertonic glucose for administration, starting with 0·01 gm. and increasing gradually, according to the patient's tolerance, to 0·05 gm. Treatment was suspended when a total dosage of 1·0 gm. was reached, and repeated after an interval of " some months ". If there was

intolerance, the drug fouadin, given intravenously, was found very serviceable. Repodral [see this *Bulletin*, 1947, v. 44, 220], says the author, is excellent but needs great care in watching for toxic symptoms [but none of the patients detailed in this account was given Repodral]. *H. Harold Scott*

SCHWETZ, J. La classification et la nomenclature des *Planorbidae* (*Planorbinae* et *Bulininae*) de l'Afrique Centrale et surtout du Congo Belge. [**Classification and Nomenclature of the *Planorbidae* especially in the Belgian Congo.**] *Institut Royal Colonial Belge. Section des Sciences Naturelles et Médicales. Mémoires.* (Collection in-8°.) 1947, v. 16, No. 2, 91 pp. [31 refs.]

In this useful study of a collection of molluscs in the Museum of Belgian Congo at Tervueren, the classification and nomenclature of the Planorbidae are dealt with in a manner more lucid and refreshing to a layman than might reasonably be expected with such a difficult group. Any such contribution to the important subject of intermediaries of the Schistosomes in Africa, though in this case it has special reference to the species occurring in Belgian Congo, must have special interest to medical officers in the Colonies. But the author is at pains to emphasize that although a knowledge of the correct classification is highly desirable in those who perforce or by natural interest must concern themselves with these disease carriers, the subject is a mass of pitfalls for the amateurs and that even the " experts " cannot agree with one another on certain questions of nomenclature. This is no reflection on the probity of the experts, but an illustration of the extreme complexity of the subject. He quotes J. Bequaert in this connexion :—" The Planorbidae are a very difficult group, owing to the relatively slight differences separating the genera and species, and the great variation within specific limits. One must not expect two students to agree in every case and I admit freely that I change my own opinion from time to time."

Advice to intending investigators is contained in another quotation from Bequaert :—" There are several pitfalls to guard against in the study of molluscan hosts of parasitic worms. The most outstanding is the unwarranted indictment of any fresh-water mollusk that happens to be abundant in a locality where cases of fluke infections occur. It should be fully realized that carefully controlled experiments must be forth-coming before one can incriminate a given snail as harboring the parthenetic generations of a parthogenic trematode.

" After the molluscan host is established beyond doubt, its correct identification may prove an arduous task. In the absence of comprehensive works on the Mollusca of most tropical and subtropical countries, it is strongly recommended to submit specimens to one of the leading malacologists. In many genera of fresh-water mollusks, the distinction of species is based on characters that are difficult to describe or even to illustrate. Identification has to proceed through comparison with specimens of allied species or from several localities, which can only be undertaken in one of the larger museums." *J. J. C. Buckley*

SCHWETZ, J. & DARTEVELLE, E. Recherches sur les mollusques de la bordure orientale du Congo et sur la bilharziose intestinale de la Plaine de Kasenyi, Lac Albert. [**A Study of Molluscs on the Eastern Border of the Belgian Congo and of Intestinal Schistosomiasis in the Kasenyi Region.**] *Institut Royal Colonial Belge. Section des Sciences Naturelles et Médicales. Mémoires.* (Collection in-8°.) 1944, v. 14, No. 2, 77 pp., 5 maps (1 folding) & 3 pls. [Bibliography.]

This is an account of a malacological survey along the eastern border of Belgian Congo, from Lake Kivu to Lake Albert. Particular attention was given to snail collecting in the Kasenyi region on Lake Albert where intestinal

schistosomiasis is prevalent. The first part of the report contains more or less detailed descriptions of localities and habitats and an account of the species of snails found therein. This is followed by a systematic list of all the species collected and a discussion on their ecology and distribution. In the second part, available records of the population incidence of schistosomiasis in the Kasenyi area are considered in relation to the ecology of Planorbid intermediaries. The authors' conclusions are at variance with the local belief that the disease is associated with fishing, and are supported by a comparative study of the incidence in different population groups and by the fact that Planorbids are most abundant in streams and in creeks which are not fished very much.

J. J. C. Buckley

YOLLES, T. K., MOORE, D. V., DEGIUSTI, D. L., RIPSOM, C. A. & MELENEY, H. E. **A Technique for the Perfusion of Laboratory Animals for the Recovery of Schistosomes.** *J. Parasitology.* 1947, Oct., v. 33, No. 5, 419–26, 8 figs.

The detailed description and illustrations of the procedure in this perfusion technique, which is a modification of that of Faust & Meleney [this *Bulletin,* 1925, v. 22, 468], does not lend itself to a brief account and should be read in the original.

J. J. C. Buckley

ERFAN BEY, M. **Bilharziasis of the Pancreas.** *J. Egyptian Med. Ass.* 1940, Oct. & Nov., v. 23, Nos. 10/11, 850–53.

KHALIL BEY, M. & HILMY, I. S. **The Eradication of Bilharzia from Teftiche Wadi Kom-Ombo, Egypt.** *J. Egyptian Med. Ass.* 1940, Dec., v. 23, No. 12, 965–79, 8 figs. on 4 pls. [25 refs.]

HUNTER, G. W., BENNETT, H. J., INGALLS, J. W., Jr. & GREENE, E. **The Molluscan Intermediate Host and Schistosomiasis japonica. III. Experimental Infection of** *Oncomelania quadrasi*, **the Molluscan Intermediate Host of** *Schistosoma japonicum.* *Amer. J. Trop. Med.* 1947, Sept., v. 27, No. 5, 597–602.

Adult snails (*Oncomelania quadrasi*) were collected on Leyte from areas in which *S. japonicum* infections were absent or rare, and exposed to infection with miracidia to determine (*a*) the number of miracidia that would produce the highest infection and survival rates in the snails, and (*b*) the time necessary for the production of cercariae after exposure to miracidia. Information was also sought as to reproduction of snails kept in laboratory conditions.

Individual exposures and mass exposures were carried out and the snails were kept under observation for 66 to 78 days, at the end of which time the numbers of surviving snails were regrettably small. Individual exposures with 1 to 3 miracidia gave negative results with over 600 snails, of which only 22 survived the experimental period. Exposures with 5 to 10 miracidia gave 33·3 per cent., 28·5 per cent. and 16·0 per cent. positives in 6, 7 and 25 snails respectively which survived from the original batch of 700 snails. Mass exposures gave positives in every case in 1, 2 and 8 snails which survived from 3 batches of 909, 527 and 875 respectively. There was a significant difference between the infection rates of 8·5 per cent. and 62·4 per cent. in snails examined before and after the 70th day, for which no satisfactory explanation is available.

It was thus established that the best results were obtained by exposing each snail individually to 5 to 10 miracidia and that a period of approximately eleven weeks is required for the development of the cercariae.

Although the high mortality rate in the snails kept in aquaria suggests that suitable ecological conditions were not established, evidence was obtained, in the form of young snails 5 months after the introduction of adult snails into the aquaria, that breeding was taking place. *J. J. C. Buckley*

PICK, F. & DESCHIENS, R. La distomatose à *Watsonius watsoni* (Conyngham 1904) Stiles et Goldberger 1910 chez le papion. [**Infection of Baboons with** *Watsonius watsoni*.] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 5/6, 202–11, 5 figs. on 2 pls.

Infections with *Watsonius watsoni* have been recorded commonly among the Primates, to which group they appear to be mainly confined as parasites, and only one human case is definitely known, that of Watson in a native of German West Africa in 1904 ; though Manson in 1908 described a patient with violent diarrhoea from whom many flukes were evacuated in the faeces and which were thought to be *W. watsoni*. DESCHIENS (*Bull. Soc. Path. Exot.*, 1940, v. 33, 396) recorded the infection in baboons (*Papio sphinx*) for the first time and compared the clinical effects in these animals with those described in connexion with the human infection of 1904. To these data, Pick & Deschiens now add further observations on 10 baboons harbouring adult *W. watsoni*. In four of these there was chronic diarrhoea which terminated fatally and flukes numbering 200 to 1,000 were found on autopsy. The caecum was usually the most heavily infested part of the intestine. A detailed account of the post-mortem findings in these four cases is provided. Of the other six cases, three had mild diarrhoea accompanied by daily evacuation of flukes over a period of two months, and the condition cleared up after large masses of worms had been expelled in the course of one or two days.

Four stages in the disease are recognizable : a latent period, which may last a long time ; a period of mild transitory diarrhoea of several months' duration with probable recovery ; a period of serious diarrhoea of 2 to 3 weeks ; a period of dehydration of a few days terminating in fatal cachexia.

The pathological lesions are characteristic and extend from the middle third of the ileum to the anal sphincter ; they consist principally of inflammation of the serous membrane in the infected region of the ileum ; and oedemata, congested areas and punctiform erosions of the mucosa. They are the result of mechanical and traumatic effects due to the attachment of the flukes (by the large posterior sucker) and the production of multiple stases in the circulation of the mucosa, with all the consequences of prolongation of this action. These findings contrast with those in Watson's human case, in which numerous worms were found on autopsy attached to the intestinal mucosa which was lightly congested, but not ulcerated. Death had been due to diarrhoea and inanition. *J. J. C. Buckley*

SMYTH, J. D. **Studies on Tapeworm Physiology. III. Aseptic Cultivation of Larval Diphyllobothriidae** *in vitro*. *J. Exper. Biol.* 1947, Dec., v. 24, Nos. 3/4, 374–86, 3 text figs. & 7 figs. on 1 pl. [11 refs.]

BULSARA, S. N. **An Unusual Case of Tapeworm Infestation.** *J. Ass. Med. Women in India.* 1947, Aug., v. 35, No. 2, 44–5.

A case in an Indian woman suggesting an acute abdominal condition and relieved by passing a segment of tapeworm.

DESCHIENS, R. & POIRIER, M. L'intoxication expérimentale du Cobaye par l'extrait trichloracétique de *Taenia saginata*. [**Experimental Poisoning of the Guineapig by a Trichloracetic Extract of** *Taenia saginata*. *C. R. Soc. Biol.* 1947, Oct., v. 141, Nos. 19/20, 988–9.

ARCHIVOS INTERNACIONALES DE LA HIDATIDOSIS. Montevideo. [**International Archives of Hydatid Disease.**] 1946, July, v. 6, Nos. 1/2, 606 pp., numerous illustrations.

This volume consists of 24 items, 16 of which deal with the literature, clinical features, prevention and treatment of hydatid disease, and the other 8 are concerned with the biological aspects. The last 10 pages refer to the administrative aspects of the campaign against hydatid disease. There are many and varied illustrations, some of them in colour. The volume contains a very great deal of information and is presented on lines similar to those of preceding volumes [see also this *Bulletin*, 1944, v. 41, 949].

H. J. O'D. Burke-Gaffney

MOREY SOTOMAYOR, G. Hidatidosis de la infancia. [**Hydatid in Children.**] *Rev. Hosp. del Niño.* Lima. 1947, June, v. 9, No. 31, 127–47, 10 figs.

Much attention has been paid to hydatid in adults but its presence in the child merits more than it has received. The author records 19 cases in the 7 years 1940–46. In 1940, there were seven between the ages of 8 and 12 years, 5 boys and 2 girls ; in 5 the cyst was in the lung, in one in the liver, and in one in liver, lung and brain. The last and one of the lung patients died. In 1941 and 1942, there was one case each year, a girl of 9 years with a pulmonary cyst in the first, and a boy of the same age with one in the liver in the second ; the latter died. No case was seen in the next two years. In 1945, five, 3 boys and 2 girls ; 3 had cysts in the liver, 2 in the lung. One, a boy aged 11 years, with a liver cyst died. In 1946 there were again five, 3 boys and 2 girls ; one, a boy of 7 years with liver and lung cysts died, but a girl of 8 years with both liver and lung cysts recovered. The other three were a girl of 4 years and a boy of 5 years with lung cysts, and a boy of 9 with a liver cyst ; these all recovered.

To sum up : Altogether, of the 19 cases, 13 were boys, 6 were girls ; there were 5 deaths ; 11 had pulmonary cysts, 5 had liver cysts, 2 both liver and lung cysts, and one had cysts in liver, lung and brain. Eosinophilia was only moderate in any and might be lacking.

H. Harold Scott

PRAT, D. Complicaciones y secuelas del quiste hidatídico. Es la hidatidosis una afección benigna como se la ha considerado hasta ahora? [**Complications and Sequelae of Hydatid Cyst.**] *An. Facul de Med. Montevideo.* 1947, v. 32, Nos. 7/8, 581–93, 5 figs.

CLAPHAM, Phyllis A. **On the Identification of some Species of** *Trichostrongylus.* *J. Helminthology.* 1947, v. 22, No. 1, 37–46, 32 figs.

DOS SANTOS, J. C. Estrongiloidóse associada à schistosomóse e à sífile. [**Strongyloidosis associated with Schistosomiasis and Syphilis.**] *Arquivos Univ. Bahia Facul. de Med.* 1946, v. 1, 227–50, 21 figs. on 11 pls. [17 refs.] English summary.

BASU, S. N. **Chronic Intestinal Obstruction due to Ascariasis.** *J. Indian Med. Ass.* 1947, Aug., v. 16, No. 11, 390–91.

Report of a case.

LARA, H., GAN, T. M., MATIAS, M. Y. & REYES, A. C. **Digenia Simplex as a Substitute in the Treatment of Ascariasis.** *J. Philippine Med. Ass.* 1946, June, v. 22, No. 6, 239–42.

The practical value of an anthelmintic drug depends on factors other than its therapeutic activity ; it must be available locally in large quantities, it

must be cheap, it must be easy to prepare, it must be administrable without preliminary preparation of the patient, and it must be of low toxicity.

During the Japanese occupation of the Philippines, all imported drugs became scarce and remedies with a local source had to be used. *Digenia simplex* is a seaweed which is available in large quantities on the eastern coast of Palawan. The seaweed was boiled in water, 1 kilogramme to 6 litres. This decoction was then boiled down to 1 litre. The doses given were 15 ml. for children under 7 years and 20 ml. for older children.

A preliminary stool examination for *Ascaris* ova was made in most cases and the decoction was then given. A report on the result was obtained from the patient at a later date. Out of 163 treated patients, ascarides were passed by 120 (73·61 per cent.). The decoction was given to 26 other patients who had a history of passing worms but whose stools were not examined, and of these 22 passed more worms after taking this decoction. It was also given to 27 patients who had a negative stool examination, and of these two passed ascarides. [A reference is made to post-treatment stool examinations, but no results are reported. Thus, while the authors appear to be satisfied that this drug complies with the additional requirements for an anthelmintic, they present no convincing evidence that it has any significant therapeutic activity.]

L. E. Napier

See also p. 370, MARKS, **Studies of Queensland Mosquitoes. Parts I and II.**

BUTTS, D. C. A. **Filarial Infection in Costa Rica.** *Amer. J. Trop. Med.* 1947, Sept., v. 27, No. 5, 607–15, 4 figs.

A filarial survey (*W. bancrofti*) was carried out on 1,306 persons in a house-to-house examination designed to determine the distribution and trend of filariasis in Costa Rica. In Limon, on the Atlantic coast, 101 were positive out of 1,006 examined. At Quepos on the Pacific coast of Costa Rica, 100 examinations yielded only one positive, who had lived for 9 years at Limon. An inland farm and a coastal town, each 25 miles from Limon, yielded 3 per cent. and 2 per cent. positives respectively.

It is concluded that Limon was the original endemic focus of the infection, which was probably imported from Jamaica and the West Indies and that it is likely to spread throughout Costa Rica, failing mosquito control measures. The probable vector is *Culex quinquefasciatus* [*fatigans*].

J. J. C. Buckley

HARTZ, P. H. & VAN DE STADT, F. R. **Microfilarial Granulomas, Elephantiasis and Adenosis of the Breast.** Reprinted from *Amer. J. Clin. Path.* 1947, Oct., v. 17, No. 10, 823–6, 3 figs. [12 refs.]

"Microscopic examination of tissue removed from one of the enormously enlarged breasts of a 29 year old woman showed besides beginning adenosis the presence of edema, fibrosis, conspicuous dilatation of the lymph vessels and granulomatous endolymphangitis. In the connective tissue there were several small granulomas, each containing microfilariae but showing no tissue eosinophilia. Examination of the blood showed the presence of microfilariae. A diagnosis of elephantiasis of the breast, perhaps superimposed on some form of mammary hypertrophy was made. No other instance of microfilarial granulomas of the breast was found in the literature."

OTTO, G. F., MAREN, T. H. & BROWN, H. W. **Blood Levels and Excretion Rates of Antimony in Persons receiving Trivalent and Pentavalent Antimonials.** *Amer. J. Hyg.* 1947, Sept., v. 46, No. 2, 193–211, 5 figs. [14 refs.]

Blood levels and excretion rates in 14 patients with asymptomatic *W. bancrofti* infection were studied by means of a colorimetric method for the estimation of antimony devised by MAREN [*Bull. Johns Hopkins Hosp.* 1945, v. 77, 338 ; *Indust. and Eng. Chem.*, in the press]. The treatments administered were (*a*) intramuscular injections of two trivalent antimonials, Anthiomaline and monosodium antimony thioglycollate, and (*b*) intravenous injections of two pentavalent antimonials, Neostibosan and Stibanose.

A striking finding was that trivalent antimony has a much greater affinity for blood cells than for blood plasma, whereas pentavalent antimony has little or no affinity for blood cells. The virtual absence of antimony from red cells after administration of pentavalent preparations suggests to the authors that there is essentially no reduction of antimony from the pentavalent to the trivalent state in the body. If there were, then the reduced product would be taken up by, and would be demonstrable in, the blood cells. The very slight degree of *in vivo* reduction claimed by GOODWIN and PAGE [this *Bulletin*, 1944, v. 41, 20] might, in fact, have been produced by the technical procedures involved in their method of antimony determination.

In agreement with other workers, the authors found pentavalent antimony, in general, to be excreted in much larger amounts than trivalent antimony immediately after an injection. This is attributed, at least in part, to the fact that the former remains free in the plasma and is not immediately bound to cells in the circulation. At the end of a course of treatment, of either pentavalent or trivalent antimony, excretion is more rapid than at the beginning of treatment, suggesting that the tissues may become flooded, with a slower absorption of antimony at each dose.

"With either pentavalent or trivalent antimony the plasma concentration is sustained for only a short time (well under 24 hours) which suggests that in so far as plasma levels are an index of therapeutic efficiency of a given antimony compound it is necessary to give the compound at as short intervals as is commensurate with safety. It is suggested that 12- to 24-hour intervals are superior to the longer intervals previously used." [See BROWN, this *Bulletin*, 1945, v. 42, 53 ; BROWN and THETFORD, 1947, v. 44, 338 ; ALVES and BLAIR, 1946, v. 43, 344.] *E. M. Lourie*

SANTIAGO-STEVENSON, D., OLIVER-GONZÁLEZ, J. & HEWITT, R. I. **Treatment of Filariasis Bancrofti with 1-Diethylcarbamyl-4-Methylpiperazine Hydrochloride ("Hetrazan").** *J. Amer. Med. Ass.* 1947, Nov. 15, v. 135, No. 11, 708–12.

The marked filaricidal action of 1-diethyl-carbamyl 4 methyl-piperazine hydrochloride (Hetrazan) on the filarial infection of cotton rats has been demonstrated. A clinical trial was undertaken with 26 Porto Rican patients with microfilariae in their blood ; of these, 23 were asymptomatic.

Before treatment microfilaria counts of night blood (taken between 7·45 and 8·30 p.m.) were made on three slides, each of 20 cmm. of blood. The drug was given by mouth thrice daily in doses from 0·5 mgm. to 2·0 mgm. per kilogramme of body-weight over periods of 3–21 days ; in half the cases, treatment was continued for 6 days or less, and in the rest for 11 days or more.

The reactions encountered included fever in 16 cases ; headaches in 12 ; general malaise in 9 ; lumbar ache in 7 ; anorexia, nausea and vomiting in 5 ;

painful nodular swellings in 4 ; aching joints in 3 ; weakness and cutaneous manifestations each in 2 ; and pain in the testicles, shortness of breath and pain in the abdomen each in 1 case.

In all but one case the drug produced a leucocytosis. Before treatment, the eosinophil counts ranged from 1 to 32 per cent. [actual counts not given] : 24 were above 5 per cent. There was usually an increase during treatment ; in two cases these were over 40 per cent., in six over 30 and in 12 over 20 per cent.

At the end of 48 hours there were no microfilariae in the night bloods of 9 patients and the microfilariae were markedly reduced in numbers in the other 17. At a subsequent examination after 8 to 53 days, half the cases were shown to be free of microfilariae. In only one case was there a relatively high count, 22 microfilariae in 60 cmm. after 75 days, but this patient had originally shown 339 microfilariae. This patient had received treatment for 4 days in all, but this was interrupted in the middle for a week, because of a respiratory infection. The results could not otherwise be correlated with the amount of the drug given.

The appearance in 4 cases of tender nodular swellings and of localized lymphadenitis proximal to the swellings is suggestive of the death of the adult worm. Additional confirmatory evidence is afforded by the strong eosinophilic reaction observed in all 4 and by the occurrence in 3 of them of a sharper rise of temperature, which was also of longer duration than in the rest.

L. E. Napier

NOBLE, Bertha R. Informe preliminar del estudio histopatológico de dos ojos oncocercosos. [**A Preliminary Histopathological Study of the Eye Changes in Onchocerciasis.**] *Bol. Oficina Sanitaria Panamericana.* 1947, July, v. 26, No. 7, 596–606, 16 figs.

The author, who is a specialist in the Onchocerciasis Section of the Pan American Sanitary Bureau, presents the results of a detailed histopathological study of two eyes : one was enucleated from a patient suffering from glaucoma, who was also infected with *Onchocerca* : the other was obtained at autopsy from a patient also suffering from onchocerciasis.

Details of technique are given and there are 16 good photomicrographs indicating lesions of the different parts of the eye examined, which included the conjunctiva, cornea, Bowman's membrane, substantia propria, iris, ciliary body, choroid, retina, optic nerve and peri-orbital tissues.

The author concludes that the microfilariae may be found in all the tissues of the eye, but seem to have a predilection for the conjunctiva ; no complete microfilariae could be found in the sections, but an impression was gained that they were longer than those found in the skin.

Lesions were also found in all the tissues of the eye. The inflammatory reaction was of a chronic non-specific type, similar to that produced by foreign bodies.

H. J. O'D. Burke-Gaffney

TOUMANOFF, C. & LE-VAN-PHUNG. Note au sujet d'un cas de gnathostomose humaine observée en Indochine. [**A Human Gnathostome Infection in Indochina.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 5/6, 168–74, 3 figs. [19 refs.]

The authors record and describe a case of gnathostomiasis (*G. spinigerum*) in an Annamite woman aged 42 years, from whom an immature female worm 10·5 mm. by 1 mm. was extracted.

Before its removal from a point below the left clavicle, the site of infection had been painful and slightly inflamed and later became swollen to the size

of a pea. The following day the worm was extracted (apparently by scratching the skin with a finger nail). An erythema 15 cm. in diameter subsequently formed, together with an oedema which extended upward to the neck. Both disappeared in two days after local treatment and the wound healed 8 days later.

It is remarked that the skin reaction in this case differed from those described by previous authors in that the transitory oedema occurred *after* the emergence of the worm. It is suggested that in such cases the worm might escape detection by emerging unheralded, especially at night. From the case history, the infection must have been contracted either in Indochina, in which event it would be the first recorded from that country, or in Siam 16 years ago, which would indicate an extremely slow rate of development of the parasite and a very long sojourn in the human body. *J. J. C. Buckley*

TOUMANOFF, C. & NGUYEN VAN HUONG. Un cas autochtone de gnathostomose humaine observé en Indochine. [**An Autochthonous Case of Human Gnathostome Infection seen in Indochina.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 5/6, 174–5.

Autochthonous infection with *G. spinigerum* in Indochina, strongly suggested by the case described by TOUMANOFF & LE-VAN-PHUNG [see previous abstract], is definitely established by the present authors who describe a similar infection in a Eurasian woman of 22 years who had resided all her life in Indochina. A worm, 9 mm. × 1 mm., was removed from the right lumbar region by squeezing a small irritating papule resembling a mosquito bite. Thirteen hours later, a small oedematous swelling appeared, measuring about 5 cm. × 3 cm., with a central depression of about 5 mm. × 2 mm., which was surrounded by a narrow inflammatory zone. The blood count was as follows: polymorphonuclears, 56 per cent.; large and small mononuclears, 7 and 5 per cent. respectively; lymphocytes, 20 per cent. and eosinophiles, 12 per cent. This formula is similar to that observed in the previous case of Toumanoff and Le-Van-Phung. It is remarked also that in both cases the oedematous swelling had been transitory and occurred after the worm had been extracted. *J. J. C. Buckley*

YOUNG, May R. **The Incidence of *Trichinella spiralis* at Necropsies in England.** *J. Helminthology.* 1947, v. 22, No. 1, 49–60. [45 refs.] [Summary appears also in *Bulletin of Hygiene.*]

The author examined 472 human diaphragms for *T. spiralis* infection by a "digest" technique which is described in detail.

The number examined for each town and the percentage found infected are as follows:—Birmingham, 194 (12·4); Wolverhampton, 106 (15·1); Cambridge, 37 (5·4); Bristol, 48 (12·5); Cardiff, 56 (3·57); Llandough, 7 (14·3); Leeds, 24 (all negative), which give an average infection rate of 10·805 per cent.

Statistical analyses of the figures show no significant differences between the infection rates in sexes or in age groups, but an increase in the incidence of thick-cysted infections of long standing is apparent with increasing age. With the exception of Llandough and Leeds, each of the towns furnished cadavers in which were found thick-walled calcified cysts, indicating an endemicity of considerable age, whilst unencysted larvae of recent infection were found in Wolverhampton and Birmingham cadavers. From the occurrence of infections of obviously different ages in one cadaver, it is argued that one infection does not produce permanent immunity.

Examination of 4,626 specimens of pork from Wolverhampton abattoir during 1941 and 1942 revealed no positives. Some of the pigs came from widely separated localities in England. Two of 145 rats from the Wolverhampton area were positive and nine of 116 from Penrith.

At the time of the Greenwich outbreak [DAVIS and ALLOTT, *Bulletin of Hygiene*, 1942, v. 17, 271] Argentine pork was suspected and 589 specimens were examined by the " digest " technique. All were negative. *J. J. C. Buckley*

DAVIS, W. A. & CLELAND, R. R. **Trichinosis in Prisoners of War.** *Bull. U.S. Army Med. Dept.* 1947, Nov., v. 7, No. 11, 973–6.

This paper records an outbreak of trichiniasis at Camp Atterbury, Indiana, during the second and succeeding weeks of December, 1945. The symptoms were chiefly chills, fever, cough and generalized muscular pains and aches. Together with the " explosive onset," these symptoms suggested influenza and an epidemic of influenza type B had just occurred in Fort Benjamin Harrison camp near by ; but at camp Atterbury only German prisoners of war were affected, most of the patients had had mild diarrhoea at the onset of the illness, their illness lasted longer than influenza does, their muscular pains differed from those of influenza, several patients had extensive subconjunctival haemorrhages and eosinophilia was common. Practically all the Germans admitted having eaten raw pork or bacon and the diagnosis of trichiniasis was confirmed by positive skin tests in all the 20 patients thus examined.

The infection was traced to canned bacon intended for overseas shipment and to canned pork, both issued on Dec. 7, 1945. The Germans had been told to cook the bacon and pork, but these products were issued to them raw and were eaten so. The epidemic " became manifest " 9 days after the bacon was issued. Three men suffering from trichiniasis became ill before the bacon had been issued, but they admitted having eaten raw pork earlier. By December 7, 1945, 103 patients had been admitted to hospital and 77 others were admitted to isolation barracks with symptoms similar to those shown by patients admitted to hospital. In addition, there were 409 patients with similar but milder symptoms who were kept in their quarters. The diagnosis of these two latter groups was based on clinical symptoms only, because of lack of sufficient laboratory facilities. The authors briefly discuss the prevention of trichiniasis and refer to literature, most of which has been abstracted in this *Bulletin*.

G. Lapage

NEGHME, A., FAIGUENBAUM, J., PIZZI, T., ROMAN, J., DONOSO, R., HOECKER, G., BRNCIC, D., AGOSIN, M., CHRISTEN, R., SOTOMAYOR D., R., SILVA C., R. & VILCHES, R. Epidemia de triquinosis en la Escuela Militar de Chile. [**Outbreak of Trichiniasis in a Military Training School in Chile.**] *Rev. Méd. Chile.* 1947, Aug., v. 75, No. 8, 519–24, 1 graph.

There were 474 students at the school and all were examined after sickness among them had been reported. Seventy-one were healthy, 297 were found to be infested with *Trichinella spiralis* and 106 were " subclinical." Diagnosis was made by the high eosinophilia and positive reactions to the Bachman test. Possibly another ten were infested who were away on holiday at the time the investigation was made. The symptoms on the whole were typical but mild ; gastro-intestinal disturbance, headache, general malaise and, in some, a rash, apparently petechial as it was thought at first to be typhus. Eosinophilia ranged between 0·5 and 54 per cent. The Bachman reaction was positive in 180 of the 217 in whom it was tried (82·9 per cent.) Two showed electrocardiograph changes ; one a simple A–V block, the other anomalies of the ST segment and the T wave, pointing to myocardial damage. The source of the outbreak was traced to pork and pork sausages undercooked. The period of incubation varied between 4 and 25 days, with most between 11 and 20 days.

H. Harold Scott

MACANDREW, Maureen & DAVIS, E. **Trichiniasis presenting with Foot-Drop and Facial Palsy.** *Lancet.* 1948, Jan. 24, 141.

SPRUE

AYREY, F. **Outbreaks of Sprue during the Burma Campaign.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Dec., v. 41, No. 3, 377–406. [29 refs.]

A number of papers have appeared on the unusual aspects of sprue in outbreaks among British and Indian troops in Burma. They all deal more or less with cases of the same type, and with a similar environment. The subject matter bears the same flavour of perplexity ; all the various observers pursue their individual methods of approach, though their conclusions appear equally mystifying and inconclusive. Such a one is the present contribution. It therefore covers much the same ground, but the author would explain the epidemic nature of the outbreak on dietetic grounds which others, for their own good reasons, would discard. This contribution in particular is long and detailed and therefore does not lend itself to concise summary.

The author observed a large number of military patients—over 3,000—and describes the incipient manifestations of what is usually a particularly chronic disease ; it is not surprising, therefore, that all stages of severity were encountered, but it may justifiably be concluded that the syndrome here described was indeed tropical sprue in all its various stages of development, as is borne out by the therapeutic response to liver treatment and other recognized measures. The primary aetiological factor was believed to have been a dietary deficiency of certain components of the vitamin B_2 complex, and in this respect the author finds himself at variance with others.

The majority suffered from a mild form of the disease, conforming to the recently described " para-sprue " and the author advances cogent reasons against the acceptance of what is after all a spurious division, and emphasizes that there is no fundamental difference between European and Indian cases. The most noteworthy variants were the watery, more frequent, less bulky stools and lower fat content, as compared with the typical sprue evacuations seen in peace time. For this, the relatively short duration of the disease, the amount and nature of fatty acids and carbohydrates, the intestinal hurry and deficiency of calcium were regarded as important. The large pultaceous stool of the fully developed disease is probably the outward sign of megacolon, and is therefore a later development. Not all cases showed the same pattern. The commonest features were lethargy, muscular weakness, anorexia, flatulent dyspepsia, white diarrhoea, glossitis, anaemia and emaciation.

But even in the early stages, there were abundant evidences of abnormal fat excretion. The primary causal factors were thought to be prolonged consumption of a diet inadequate in one or more components of the vitamin B_2 complex. It is claimed that there was a calculable deficiency of riboflavin, nicotinic acid and pyridoxine. This was borne out, in the author's opinion, by the excretion of subnormal amounts of nicotinic acid and the therapeutic response to parenteral and oral administration of crude liver extract and other vitamin B_2 complex preparations.

It is stated that troops subsisting on rations richer in fresh foods did not contract sprue.

[In this respect the K rations come in for some criticism. It is not stated that deficiency symptoms *per se* were due to vitamin deficiencies in these rations, but that they were so monotonous that they were not eaten. The error lay in the

assumption that men could subsist on them over indefinite periods. Bacillary dysentery was rife in these jungle-fighters and approximately 10 per cent. of them developed sprue symptoms in addition, for which the primary bacillary infection was held responsible.]

Secondary aetiological factors were the increased metabolic demands made by the ardours of this exhausting campaign, increased by malaria, dysentery, antecedent malnutrition and anaemia, and consequent anorexia. The high carbohydrate intake in Indian cases and the excessive fats in British cases were subsidiary causes. The author's final conclusion is in support of the Stannus hypothesis [this *Bulletin*, 1943, v. 40, 259] that sprue is primarily the expression of failure of phosphorylation of glucose and fatty acids through lack of co-enzymes which act as catalysts. These include certain unspecified fractions of the vitamin B_2 complex.

There was no evidence that the development of sprue was dependent on an infective agent, antecedent intestinal disease or inherent metabolic error.

That these outbreaks of sprue occurred in epidemic proportions is not considered a cogent argument against the diagnosis of sprue or as supporting the hypotheses of its infective nature. *P. Manson-Bahr*

VEDDER, E. B. **A Case of Sprue maintained on Folic Acid.** *Amer. J. Trop. Med.* 1947, Nov., v. 27, No. 6, 723–5. [12 refs.]

"Folic acid in five milligram doses by mouth daily will maintain sprue in health permanently. One five milligram tablet daily may be considered the maintenance dose for even an old case of sprue."

See also p. 360, WAGLEY, **Neurologic Disturbances with Folic Acid Therapy.**

HAEMATOLOGY

MACFARLANE, R. G. & O'BRIEN, J. R. P., in collaboration with C. G. DOUGLAS, E. M. JOPE, H. M. JOPE, R. H. MOLE, B. AMOS & P. QUELCH. **The Haldane Haemoglobinometer. I. Iron, Oxygen and the British Standards Institution Colour Standard.** *Brit. Med. J.* 1944, Feb. 19, 248–50.

Samples of heparinized venous blood from 29 men and 20 women, in normal health, were used in an investigation of the efficiency of the Haldane-Gowers haemoglobinometer. The following determinations were made on each blood sample; oxygen capacity, by the constant-volume van Slyke method; haemoglobin iron determination by the Klumpp titanous chloride method; ultra-violet and visible absorption spectra; haemoglobin estimation with the Haldane-Gowers haemoglobinometer, British Standard Institutions (B.S.I.) standards, diluting tubes, and pipettes being used; red cell count; and packed cell volume. It appeared that the 100 per cent. on the B.S.I. standard Haldane-Gowers haemoglobinometer was equivalent to about 19·7 ml. oxygen per 100 ml. and to about 49 mgm. of haemoglobin iron per 100 ml., instead of the expected 18·5 ml. oxygen per 100 ml. and 46·25 mgm. iron. It also seemed that there was a sex factor in the different proportions of iron, oxygen and colour found. Further, the iron content and oxygen capacity were not strictly proportional to the readings obtained with the Haldane haemoglobinometer and the spectrophotometer. Part of the discrepancy was due to instrumental and technical difficulties, while part may have been due to the presence of inactive haemoglobin or non-haemoglobin iron, the presence of which in larger amounts in men than in women might account for the observed sex difference. It seems

desirable that some more precise method for estimating colour, for example the National Physical Laboratory comparator, should be employed. Despite the variations observed, however, it seemed clear that the B.S.I. colour standard is equivalent to a greater mean haemoglobin, oxygen capacity, and iron content than was expected, although it is still conveniently close to the haemoglobin level associated with 5 million normal red cells per cmm. It raises questions whether the Haldane standard has always been underestimated or whether it has changed from its original value. It may also explain the supposed difference between English and American normal haemoglobin values.

F. Murgatroyd

King, E. J., Gilchrist, M., Wootton, I. D. P., Donaldson, R., Sisson, R. B., Macfarlane, R. G., Jope, H. M., O'Brien, J. R. P., Peterson, J. M. & Strangeways, D. H. **Determination of Haemoglobin. II. The Haldane Haemoglobin Standard compared with Iron and Gasometric Estimations.** *Lancet.* 1947, Nov. 29, 789–92, 1 chart. [20 refs.]

It has been possible to make available at a reasonable cost standard Haldane haemoglobinometer colour tubes with an accuracy corresponding to $\pm \frac{1}{2}$ per cent. in haemoglobin concentration and an average rate of change of colour of only 0·2 per cent. per year. Careful experiments confirm that the B.S.I. Haldane-Gowers haemoglobinometer standard is equivalent to significantly more haemoglobin that was originally supposed. From iron determinations it appears that 100 per cent. on the standard is equivalent to 14·8 grammes of haemoglobin, while oxygen capacity determinations give a mean figure of 14·4 gm. of haemoglobin. The difference may in part be due to experimental errors and in part to the presence of inactive haemoglobin in certain blood samples, which would give a low oxygen capacity per unit of haemoglobin iron. The sex differences previously found in the relationship between the colour, iron content, and oxygen capacity of haemoglobin was not confirmed by the more precise determinations described in the present paper ; therefore no separate definition for the standard is required for male and female blood. The problem now arises whether the standard should be taken as 14·8 gm. or 14·4 gm. of haemoglobin. The latter figure corresponds to the van Slyke oxygen-capacity method, but in terms of haemoglobin mass is probably too low, since by iron determination 14·8 gm. of haemoglobin is obtained and 14·7 gm. by CO capacity after reduction. The figure derived from iron determination, therefore, seems to be correct, and such a figure would bring into agreement the normal English and American haematological values. The mean figures for red cell count and mean corpuscular volume accepted in England and the U.S.A. are almost identical, and the supposed difference in haemoglobin content has always been difficult to explain. English surveys have used the Haldane-Gowers haemoglobin method, and even the most experienced observers read on the average 4 per cent. too low by this method ; whereas most American figures are based on oxygen capacity. *F. Murgatroyd*

Wright, G. P. **Determination of Haemoglobin.** [Correspondence.] *Lancet.* 1947, Dec. 13, 890.

Criticisms of the Haldane haemoglobinometer usually centre on the absolute value and stability of the standard, and the accuracy of the final colour matching. If the results obtained with the Haldane haemoglobinometer are to be expressed in terms of oxygen capacity, it is essential that the gasometric method used for the latter determination be stated, if the significance of the figure is to be correctly appreciated, since the Haldane method for blood-gas analysis gives a

reading between 2 and 6 per cent. lower than that given by the method of van Slyke. Secondly, in matching the diluted haemolysed blood against the standard in the Haldane instrument, it is very important to observe the simple precautions laid down by Haldane himself. Before discarding the Haldane haemoglobinometer for clinical use, careful consideration should be given to its many advantages. The modern carboxyhaemoglobin standards can be accurately calibrated both at the time of manufacture and subsequently during use, and they remain stable for several years. The glassware can also be calibrated accurately and any needed correction applied. In contrast to photo-electric methods, the Haldane method is little affected by slight turbidities in the final solution ; and unusual haemoglobin derivatives, such as methaemoglobin after sulphonamide therapy, can often be detected by their tint.

F. Murgatroyd

GOODALL, J. W. D., GOODALL, Hilda I. & BANERJEE, D. **Folic Acid in Nutritional Anaemia.** *Lancet.* 1948, Jan. 3, 20–21.

Ten cases of nutritional anaemia were studied in Calcutta. The criterion was severe anaemia which did not correspond to the pure iron-deficiency type ; these cases represented examples of dimorphic anaemia. Four were undoubtedly nutritional macrocytic anaemia after childbirth ; the patients were so weak that they were unable to stand. Their red cell counts were about 500,000 per cmm. and haemoglobin was in the neighbourhood of 2 gm. per 100 ml. They were of the type where blood transfusion is contraindicated, but since the introduction of folic acid there have been no fatalities. One patient in particular did not respond to liver and iron for 15 days ; but within five days from the commencement of folic acid, progressive improvement was registered.

Megaloblasts were present in the bone marrow in seven out of the ten cases.

It is concluded that folic acid in 10 mgm. doses twice daily gives a rapid haematological response in nutritional macrocytic anaemia and an equally rapid improvement is noted in the diarrhoea, fever and oedema which is often present in these cases ; furthermore it is effective whether the bone marrow is normo- or megaloblastic and is superior to liver extract in these cases. It is specially recommended as a simple remedy in the nutritional anaemia of women after childbirth.

P. Manson-Bahr

WAGLEY, P. F. **Neurologic Disturbances with Folic Acid Therapy.** *New England J. of Med.* 1948, Jan. 1, v. 238, No. 1, 11–15.

In this paper, the author suggests some limitations of the therapeutic value of folic acid. He studied 14 cases of macrocytic anaemia, comprising 10 cases of pernicious anaemia, one of tropical sprue, 2 of non-tropical sprue and one of macrocytic anaemia after total gastrectomy. Nine cases are discussed in detail. The response to folic acid was excellent in the single case of tropical sprue and one of the two cases of non-tropical sprue, and no neurological disturbances developed in these three cases.

Neurological disturbances developed or recurred in 8 of the 10 cases of pernicious anaemia : in 3 of the 10 cases glossitis either developed or was unresponsive to folic acid. The response in the patient who developed macrocytic anaemia after total gastrectomy was slow, but improvement did occur ; the treatment was changed to liver therapy in the later stages.

The author suggests that his observations indicate that, with our present knowledge, the use of folic acid " entails a definite risk of injury to the nervous system in pernicious anaemia."

H. J. O'D. Burke-Gaffney

VENOMS AND ANTIVENENES

CHRISTENSEN, P. A. **Formol Detoxication of Cape Cobra** (*Naja flava*) **Venom.** *South African J. Med. Sci.* 1947, June, v. 12, No. 2, 71–5.

Cape Cobra venom loses toxicity, combining power and nitrogen when exposed to the action of formalin. The rate of loss of toxicity increases with increasing formalin concentration and increasing *p*H, and the loss is due partly to formation of toxoid and partly to destruction.

Some loss of antigenicity accompanies loss of toxicity and combining power may be completely lost after the prolonged action of formalin. Martin's broth, *per se*, is not necessary for detoxification ; its action is that of a buffer and if the reaction of saline solutions of venom is adjusted to *p*H 7, toxoid formation proceeds normally and yields a superior product. Optimal conditions are low concentration of formalin and low *p*H, and under these conditions the tendency for the formation of undesirable precipitates of low antigenic value is reduced. *P. Hartley*

BURETTE, J. La strychnine intraveineuse dans les evenimations par colubridés du genre *Dendroaspis*. [**Intravenous Strychnine in Bites by Colubrines of the Genus** *Dendroaspis*. *Ann. Soc. Belge de Méd. Trop.* 1947, June 30, v. 27, No. 2, 195–9.

AHUJA, M. L., VEERARAGHAVAN, N. & MENON, I. G. K. **Effects of Heparin on the Action of the Venoms of some American Viperine Snakes.** *Indian J. Med. Res.* 1947, July, v. 35, No. 3, 227–32.

" 1. Experimental evidence is presented to show that heparin effectively neutralizes, *in vitro*, the blood coagulant action of the venoms of viperine snakes : *B. alternatus*, *B. jararacussu*, *B. atrox*, *B. cotiara*, *B. neuwiedii* and *Crotalus terrificus*.

" 2. Heparin counteracts some of the toxic effects of the venoms of *B. alternatus*, *B. jararacussu*, *B. atrox* and *B. cotiara* in experimental animals.

" 3. The trial of heparin as a therapeutic agent in the bites by the above-mentioned viperine snakes is suggested."

BILLMAN, D. E. **Arachnidism, with Report of a Case.** *U.S. Nav. Med. Bull.* 1947, Nov.–Dec., v. 47, No. 6, 975–82, 4 figs. [13 refs.]

Report of a case resembling an acute abdominal condition.

DERMATOLOGY AND FUNGUS DISEASES

O'BRIEN, J. P. **A Study of Miliaria Rubra, Tropical Anhidrosis and Anhidrotic Asthenia.** *Brit. J. Dermat. & Syph.* 1947, Apr.–May, v. 59, Nos. 4/5, 125–58, 26 pls. (1 with 2 coloured sketches) & 1 text fig.

As the author points out, few common tropical diseases have received less attention than miliaria rubra. This article embodies the results of two years' research embracing the clinical, histological and experimental aspects of miliaria rubra, tropical anhidrosis and anhidrotic asthenia, the subject being an

Australian soldier. The author suggests that miliaria rubra and tropical anhidrosis represent the acute and chronic phases of sweat gland occlusion, while anhidrotic asthenia is a general metabolic disorder resulting from widespread occlusion of sweat glands and consequent reduction in total sweat production.

Although on superficial inspection the skin appears normal as soon as the symptoms of miliaria have passed away, every affected gland does, in fact, remain chronically obstructed for a long time afterwards. Close inspection of the skin involved shows keratin plugs discernible as multiple minute greyish, shining macules. After the patient has undergone severe physical effort, close scrutiny reveals deep vesicles implanted within the skin ; these vesicles can be seen to disappear after the person affected has rested in a cool place. With the starch-iodine technique it may be demonstrated that each of these vesicles indicates the site of an obstructed sweat duct. If anhydrous lanoline is smeared on an area of unclothed anhidrotic skin, and the subject exercised, profuse secretion of sweat occurs on this area while the rest of the skin remains completely anhidrotic. This is clearly illustrated in a photograph.

When a large portion of the covered parts is rendered sweatless, and the subject attempts physical effort in heat, anhidrotic asthenia results. This is characterized by symptoms of exhaustion, transient amaurosis, vertigo, frontal headache, dyspnoea, palpitation and the sensation of heat. The author considers that some impairment of tropical adaptation results from blockage of half a person's sweat glands, and where two-thirds or more are blocked the loss of adaptation may be severe. After some experience, examination of all affected persons immediately after exercise will allow precise immediate assessment of the degree of tropical adaptation in each individual case.

The histological changes of sweat gland occlusion are illustrated by thirty-four plates, in which four stages are illustrated. Stage I shows the closure of the sweat pore as a result of the swelling and closure of the keratin ring at its mouth ; Stage II shows the primary rupture of the sweat duct and the formation of the miliarial vesicle as a result of pressure built up within the obstructed sweat gland ; Stage III shows the formation of a keratin plug at the site of the obliterated vesicle ; and Stage IV the secondary rupture of the sweat duct and the formation of the deeper vesicle of tropical anhidrosis.

The suggestion is made that sebaceous deficiency in the tropics causes a physical change in the keratin ring surrounding the sweat duct, with resultant occlusion and rupture of the duct. In the presence of lipoid the keratin lamellae are softened, the ring becomes pervious again, and sweating occurs. This is the author's interpretation of the result of the experiment in which sweating occurs after lanoline has been smeared on the anhidrotic skin. Treatment is therefore aimed at desquamation of the stratum corneum with 10 per cent. salicylic acid in 90 per cent. alcohol, followed by inunctions of lanoline to restore the lipoid deficiency.

[This is a most interesting article based on a very detailed study of miliaria rubra and its effects. The author advances an ingenious suggestion for the mechanism of its causation.] *H. T. H. Wilson*

LOEWENTHAL, L. J. A. **Tropical Lichenoid Dermatitis.** *Arch. Dermat. & Syph.* 1947, Dec., v. 56, No. 6, 868–9.

" A historical retrospect of tropical lichenoid dermatitis includes a case seen by me in 1935. Attention is drawn to the absence of lesions of the glans penis."

See also p. 370, LORD & JOHNSON, **The Production of Dermatitis by Pyrethrum and Attempts to produce a Non-Irritant Extract.**

VARELA, G. & AVILA, C. **"Mal del Pinto" or "Carate" and its Treatment with Chlorhydrate of 3-Amino-4 Oxiarsenbenzen (Mapharsen).** *Amer. J. Trop. Med.* 1947, Nov., v. 27, No. 6, 663–72, 4 figs. & 1 map. [42 refs.]

There are said to be 700,000 cases of pinta in the Americas, of which 270,000 are in Mexico. The causal organism *Treponema carateum* was discovered in 1938. It develops abundant growth "in cultures of nervous tissues of mouse embryos" (simplified technique of Dr. Pomerat, Medical School of University of Texas [no details or reference given]). There is said to be no immunity to reinfection during the disease or after recovery, nor to infection with syphilis. Yaws patients are claimed to be partially immune.

The author, working at Arcelia, Mexico, found 56 per cent. of children of parents infected with pinta were themselves infected, while only 43 per cent. of those having parents free from pinta were affected. The coloured, red, pink, blue, brown and white, lesions, or pintides, are more numerous on the exposed surfaces of the body and shoulders. Palpitations occurred in 40 per cent. (of 200 patients) and the blood pressure tended to be low. Other authors have reported aortic lesions in pinta and also a high incidence of positive Wassermann and Kahn reactions which did not respond very readily to treatment. No changes have been found in the cerebro-spinal fluid.

The authors gave 0·04 grammes of "Mepharsan" twice weekly to men and women for a maximum of 15 doses. Of 66 cases observed for periods up to one year, in only three had the intensity of the Kahn reaction decreased and in 60 there was some improvement in the coloured areas. *C. J. Hackett*

SILVA, F. Lesões pulmonares da blastomicose de Lutz-Splendore-Almeida. [**Pulmonary Lesions in Blastomycosis.**] *Arquivos Univ. Bahia Facul. de Med.* 1946, v. 1, 321–31, 6 figs. on pls. English summary.

Two cases due to *Paracoccidioides brasiliensis* improved by sulphonamides.

DE CASTRO PALOMINO, J. & ALFONSO y ARMENTEROS, J. Abcesos hipodermicos metastasicos en un caso de cromoblastomicosis. [**Metastatic Subcutaneous Abscesses in a Case of Chromoblastomycosis.**] *Rev. Sifilografia, Leprologia y Dermatologia.* Marianao, Cuba. 1947, Apr., v. 4, No. 2, 63–71, 11 figs.

TROPICAL ULCER

PINKERTON, J. M. **Tropical Ulcer, as seen in South Iran, and its Treatment with Penicillin.** *J. Trop. Med. & Hyg.* 1947, Dec., v. 50, No. 12, 243–51, 8 figs.

Tropical ulcer is very prevalent in South Iran, causing much invalidism and a certain number of deaths; it is usually associated with under-nourishment and bad hygienic conditions.

The author divides his cases into two main types—Type I "simple tropical ulcer" and Type II "phagedaenic" tropical ulcer. A few cases are classified as "transitional" or as "atypical".

Type I ulcers are irregularly circular, with a rolled edge or reddish-purple colour and a base of paler exuberant granulations exuding thin sero-pus. These ulcers seldom exceed 4 or 5 inches in diameter and are usually on the lower extremity, most often in the region of the tendo Achillis or external malleolus. Cases of this type invariably show Vincent's bacilli and spirochaetes, often associated with staphylococci and sometimes with other organisms. There is

often a marked resemblance to rodent ulcer and the author excised some of his earlier cases for this reason. This type is seasonal in its incidence and occurs during the first autumn rains in November, after the long hot summer; it is more common after a poor harvest.

Type II is believed to develop from Type I by infection with anaerobic gas-producing organisms; although bacteriological proof of this has not been obtained. The ulcer enlarges, its base becomes deeply excavated, lined by wash-leather or dark green or black sloughs, and the discharge becomes copious and foul-smelling. Spreading gangrene occurs, involving fascial planes, tendons and structures with a poor blood supply. Toxaemia begins with intermittent fever and progressive anaemia, the ulcer may enlarge to an enormous size, even encircling the whole limb, and before the advent of penicillin amputation offered the only hope, although even then gangrene was liable to occur in the stump. The bacteriology of Type II does not differ much from that of Type I. Type II hardly ever attacks the young and vigorous. There are a few ulcers of an atypical kind, often on the upper limb, which are common in Europeans.

Nine cases treated with penicillin are described. The first was a case of "atypical" tropical ulcer, 1 inch by ¾ inch, on the middle finger of an American cook, which had followed upon a septic wound and had remained stationary for two weeks in spite of various forms of treatment. Wassermann and Kahn reactions were negative and Leishman-Donovan bodies and *Trep. pallidum* were not found. Penicillin was given by intramuscular injection in doses of 20,000 units every 4 hours omitting one dose (100,000 units in the 24 hours). This was continued for three days (300,000 units in all), and on the fourth day the ulcer was healed. The remaining cases were all in Iranians.

Case 2. Typical Type I. Ulcer four inches in diameter above the external malleolus. Wassermann and Kahn reactions negative. Penicillin, 100,000 units daily was given intramuscularly for five days with marked effect. The area, now clean, was covered with a Thiersch graft which was 90 per cent. successful and three weeks later the whole ulcer was healed.

Case 3. Typical Type II. The patient had been under various treatments for 3 months with no improvement. Wassermann and Kahn were negative. Anaerobic cultures were made with negative result. The patient was very toxic and had a large foul-smelling ulcer in the popliteal region. Penicillin was given intramuscularly, 100,000 units daily for five days with striking immediate effect. Within a week the condition relapsed and thorough débridement, together with opening up a sinus extended to the buttock was performed, and penicillin 100,000 units daily for five days was again given. The wound was packed with saline gauze and the limb put in plaster: twelve days later the plaster was removed and ten days after this Thiersch grafts were applied. These were only partly successful but healing was complete within a month, penicillin cream being applied locally.

Cases 4, 5, 6. These were Type I ulcers in young men in good condition. All received 400,000 units of penicillin in four days and recovery was rapid. Skin-grafts were applied in all, with complete success, and the patients left hospital completely healed within a month.

Case 7. This was an ulcer in the popliteal space, classed as of transitional type although the patient was already showing signs of toxaemia; 500,000 units of penicillin produced rapid improvement in the general and local condition. Skin grafting was delayed for treatment of a heavy *Bact. coli* infection, but the patient left hospital after three months with the ulcer healed.

Case 8 was "transitional". A sloughing tendo Achillis was seen in upper part of the ulcer. A tentative attempt to pull out the slough without an anaesthetic failed, and 500,000 units of penicillin were given. Temporary

improvement occurred but when the drug was stopped, the ulcer began to spread again. No further supply of penicillin was available at the time and a month later the ulcer had enlarged considerably and the whole length of the slough had been removed, together with over half the tendon. A second course of 400,000 units of penicillin was given and skin grafting was possible within a week. The ulcer had healed after four months' treatment.

Case 9. Type II ulcer. A man aged 50 had been under treatment for two and a half months with progressive enlargement of the ulcer which was of enormous extent—10 by 8 inches—over the dorsum of the foot. The patient was wasted and very toxic with intermittent pyrexia. After the superficial sloughs had been removed, he was given two courses of penicillin, separated by a short interval and totalling 1,600,000 units, with dramatic effect. This case, however, proved very obstinate owing to a heavy secondary infection with *Ps. pyocyanea* and *Bact. coli*, and developed a generalized eczema, believed to be an allergic reaction to penicillin cream. The ulcer was healed in a little less than four months after commencement of treatment with penicillin.

In his summary the author observes that " Type II " ulcers, before the advent of penicillin, almost invariably caused death unless amputation was performed: that Vincent's bacilli and spirochaetes are met with in all types and disappear after penicillin treatment; penicillin proved to be specific for all types of tropical ulcer; in " transitional " and Type II ulcers, thorough débridement is an essential preliminary to penicillin treatment; and the only ill-effect of penicillin treatment was a severe allergic skin reaction in one case. [See also this *Bulletin*, 1948, v. 45, 209.] *C. F. Shelton*

MISCELLANEOUS DISEASES

DAVIES, J. N. P. **Pathology of Central African Natives. Mulago Hospital Post Mortem Studies IV.** *East African Med. J.* 1947, Oct., v. 24, No. 10, 352–62. [24 refs.] [Summary appears also in *Bulletin of Hygiene*.]

This paper continues the author's previous records [this *Bulletin*, 1948, v. 45, 211] and deals with tuberculosis in Africans. He begins by referring to various differences in the type of infection and the course of the disease in Africans as compared with Europeans. Although it is generally agreed that the disease as met with in Central and East Africa is of a severe and acute type, no instances have been found of the very malignant form described in 1920 in Senegalese who had been transported to France and which followed on a primary tuberculous ulceration of the trachea and bronchi. WILCOCKS in East Africa [*Bulletin of Hygiene*, 1938, v. 13, 628] found active pulmonary tuberculosis to be common and fibrotic reactions relatively uncommon. This has been the experience of many other workers.

The author divides his cases seen in Kampala into two groups: (1) Those autopsied from May 1931 to May 1946; and (2) those autopsied in 1946, there being an overlap of 25 cases. The reason for this separation is that in 1946 closer observation has been made in certain aspects of the disease.

In group (1), out of 2,994 autopsies, evidence of tuberculosis was found in 11·8 per cent., and in group (2) out of 460 cases, in 18 per cent. The apparent increase in incidence was not a true one, but the result of greater interest being shown in the disease; as many fatal cases as possible were examined.

In group (1), of 354 cases of tuberculosis 86·8 per cent. were pulmonary and 13·2 per cent. non-pulmonary, while in group (2) the figures were 88·7 and 11·3 per cent. respectively. Bone and joint affections were rare, but a high proportion showed glandular involvement.

The evidence found post-mortem suggested that in Uganda the disease is rarely of the adult " reinfection " type, but is usually the result of a primary infection with formation of a Ghon focus which fails to heal and leads to dissemination. In many instances, the lungs are riddled with acute tuberculous abscesses (a condition described by the author as " pantuberculosis "). In those cases where it was possible to determine the initial focus (about a fifth to a quarter) this was in the lower lobe, but in many cases this focus could not be found. The pulmonary lesions were of a very acute type, fibrotic phthisis was very rare and the picture was one of a purulent infection without cavitation but with ragged thin-walled abscesses, the sputum teeming with tubercle bacilli. Laryngeal and tracheal lesions were frequent and the same applied to tuberculous ulceration of the intestines, while miliary dissemination and giant cell formation were common.

In 1946, the duration of the illness was noted in 35 cases and found to average 7·7 months. Only 6 children were autopsied ; the average age of 286 adults examined was 29·5 years. No cases of healed phthisis were found, but 5 chronic cases were noted. Adrenal tuberculosis was seen in one case only and renal tuberculosis was uncommon ; surgical tuberculosis, while met with in the wards, was not often found at autopsy. Tuberculous peritonitis was common and the incidence of myocardial tuberculosis relatively high. A striking lesion was a general glandular form of tuberculosis, this being found in 15 cases. Every lymphatic system in the body may be involved, and in some cases there may be a close resemblance to Hodgkin's disease.

It would appear that in Uganda the great majority of cases are of the human type of infection [see CARMICHAEL, *Bulletin of Hygiene*, 1939, v. 14, 215]. Tuberculin testing has not been carried out to any great extent in Uganda, but it may be noted that Connolly in 1941 in the Nyanza Province of Kenya obtained 28 per cent. of positives at ages 13–17 and up to 53 per cent. positives in adults ; he contrasts these results with the absence of cases of tuberculosis, and thinks that under conditions in the reserves the African can deal with this infection. In Uganda it appears from post-mortem findings that tuberculosis is usually " primitive " tuberculosis, and the anatomical evidence tends to show that most Uganda Africans never have the chance of being infected. When this does occur, a very few develop a primary complex which they can overcome, the remainder when they do meet infection (usually by inhalation) develop a massive primary infection which may be situated anywhere in the lungs, dissemination taking place through the glands, the blood stream, or by bronchopneumonic spread. The whole process tends to be rapid and death occurs without any attempt at localization. This is the clinical interpretation as well and there is no evidence of anything but a primary complex being healed. *C. F. Shelton*

MAYHEW, R. L. **Creeping Eruption caused by the Larvae of the Cattle Hookworm** *Bunostomum phlebotomum*. *Proc. Soc. Exper. Biol. & Med.* 1947, Oct., v. 66, No. 1, 12–14, 1 fig.

While engaged in inoculating the skin of calves with third stage larvae of *Bunostomum phlebotomum*, the cattle hookworm, the author on a number of occasions noted the appearance of small inflamed spots between his fingers. Some of these increased to about ¼ inch in diameter in a few hours, and 2 to 3 days later, a narrow linear tortuous eruption appeared : this extended at intervals for a few days. Later, a raised vesicular line usually developed within a few hours : it might be interrupted in some places. The affected area became swollen and intensely itchy, especially in the mornings. The condition usually cleared up, with a scaly skin, in about a fortnight.

A typical lesion acquired in this way in 1946 is described in detail, with daily records of its development. This occurred on the interdigital surface of the ring finger and is illustrated in a photograph. Areas where hair follicles were present were not affected, so that there was no evidence that the larvae penetrated by way of these follicles.

Evidence is also given to show that, in man and calf alike, a prickling sensation was produced almost immediately after the application of the larval suspension to the skin.

The lesions correspond closely with those seen in creeping eruption caused by the larvae of the dog hookworm, *Ancylostoma brasiliense*; but in the case of the cattle hookworm, the duration of the lesion is less prolonged: in the author's experience it lasts from 1 to 3 weeks, while that caused by the dog hookworm lasts from several weeks to months.

It is also suggested that the cattle hookworm larvae do not penetrate in such large numbers. Secondary infection sometimes develops in creeping eruption, as a result of continued scratching, but no such complication was noted by the author in the case of the present lesions. It is also noted that the eruption caused by the cattle hookworm has much in common with schistosome dermatitis; but there is no migration in the latter condition.

H. J. O'D. Burke-Gaffney

BREA, C. A. & CANALE, E. C. Miasis vulvar. [**Myiasis of the Vulva.**] *Rev. Asoc. Med. Argentina.* 1947, Oct. 15–30, v. 61, Nos. 615/616, 734–5, 3 figs. [16 refs.]

Account of a case caused by the larva of *Cochliomyia hominivorax*.

ROSS, S. G. **Preliminary Report on Fish Poisoning at Fanning Island (Central Pacific).** *Med. J. Australia.* 1947, Nov. 22, v. 2, No. 21, 617–21.

The author gives an account of 55 cases of fish poisoning under his personal observation between February 1946 and the first week of April 1947. Forty other cases were reported to him during this period, making 95 in all out of a population of 224.

The symptoms were the same as those recorded previously from the Marianas and Honolulu and may be briefly summarized here [they have been described more fully in this *Bulletin*, 1945, v. 42, 592, 593; 1946, v. 43, 595]. The indigenous people cook the whole fish on burning coconut husks after wrapping it in green leaves, mostly pandanus or palm tree leaves; Europeans clean the fish and cook the flesh only. Symptoms of poisoning occur after either form of preparation for eating and the poison is in the fresh fish. In one instance recorded, the fish, a schnapper, was caught at 3 p.m., cleaned at once and put on ice, fried at 4 p.m. and eaten an hour later by 8 persons. All were taken ill 4–5 hours after with gastro-intestinal disturbances followed by numbness and tingling in face and limbs, a sensation of intense cold when hands or feet were immersed in water at room temperature, or in the mouth on attempting to drink. The pulse was slow, 35–40 per minute and pupils contracted [reaction to light or convergence is not mentioned]. The gastro-intestinal symptoms soon cleared off, but the nervous symptoms did not disappear for a week or more and a general weakness might persist for several weeks. No fatal case is reported, but the author states that the clinical symptoms generally are becoming more severe and the nervous features more marked. So far, ten species of fish have given rise to these symptoms; the popular and local names are stated, but not the scientific names. Those mentioned are: Rock cod (grey and red), Blackjack, Bonefish, Reef fish, Schnapper, Greenfish, Mullet, Red Schnapper and Bream. The first, the Reef fish and the last-named are non-migratory, the others migratory. All except the Blackjack

were caught at places where the Americans had dumped perished food and war materials, tank mines, ammunition, batteries, copper wire, etc. The symptoms were rather like those of aconite poisoning, but may be due to some metal. Treatment is symptomatic. Cats, dogs and ducks fed on the fish develop the same symptoms of gastro-intestinal irritation and paralysis. [Further research is called for and should prove of much interest.] *H. Harold Scott*

CHAND, A. & GUPTA, D. C. **Tropical Eosinophilia with Melaena as Complication during Arsenical Therapy. A Case Report.** *Indian Med. Gaz.* 1947, July, v. 82, No. 7, 402–4.

YOUNG, C., Jr. **Ainhum or Dactylolysis Spontanea. Report of a Case.** *Southern Med. J.* 1948, Jan., v. 41, No. 1, 29–31, 4 figs. [12 refs.]

BRICEÑO ROSSI, A. L. Carate o mal del pinto. Clinica. Diagnóstico diferencial del carate o mal del pinto. [**Differential Diagnosis of Pinta.**] *Medicina.* Mexico. 1947, Dec. 10, v. 27, No. 545, 529–46, 6 figs. [19 refs.]

PROTOZOOLOGY: GENERAL

GUIMARÃES, F. N. & MEYER, H. Cultivo de "Toxoplasma" Nicolle & Manceaux 1909, em Culturas de Tecidos. [**Tissue Culture of Toxoplasma.**] *Rev. Brasil. Biol.* 1942, Mar., v. 2, 123–9, 12 figs. [12 refs.]

A strain of *Toxoplasma* isolated from a pigeon proved to be pathogenic to dogs, cats, rabbits, guineapigs, mice and pigeons. The organism was successfully cultivated in chick embryo tissue culture in which active multiplication by binary fission occurred. Many cells filled with parasites, which often arranged themselves as rosettes, were present in the cultures. The culture forms were shown to be inoculable to mice after 6 to 9 weeks of cultivation. Contrary to statements made by other observers, the organism is motile and may be seen to approach cells in the culture, to indent the cells by pressure of its anterior end (called by the author the trombicula) and finally to enter the cell. Stationary parasites may commence to move and may in an undulating manner progress for a considerable distance. That movements must occur is proved by the presence of parasites in cells which are not phagocytic. The typical parasite is crescentic in shape with a more pointed anterior end, the trombicula. The nucleus is spherical, with a central karyosome. The paper is illustrated by a series of excellent microphotographs. *C. M. Wenyon*

i. DE LANGE, C. Encephalitis toxoplasmatica. [**Toxoplasmic Encephalitis.**] *Nederl. Tijdschr. v. Geneesk.* 1941, Mar. 15, v. 85 (i), No. 11, 1151–2.

ii. VOS, J. J. T. Encephalitis toxoplasmatica. *Ibid.* 1941, May 31, v. 85 (ii), No. 22, 2401–8, 15 figs. on 1 pl. [13 refs.]

BRUG, S. L. & VOS, J. J. T. Toxoplasmosis hominis. [**Human Toxoplasmosis.**] *Ibid.* 1942, Nov. 28, v. 86 (iv), No. 48, 2956–63, 47 figs. on 1 pl. English summary (3 lines).

i. A case described by Cornelia DE LANGE in 1929 (*Ztschr. ges. Neur. Psych.*, 1929, v. 120, 465) from Amsterdam in a hydrocephalic child which died at the age of 3½ months. It was only at a later examination of sections of the brain in 1941 that the nature of the disease as toxoplasmosis was determined.

ii. In 1936 Vos, at Groningen, performed a postmortem examination on a hydrocephalic child 5 weeks of age who died of convulsions and paralysis. The brain showed calcareous deposits and inflammatory lesions. The material was put aside till later when a paper by WOLF, COWEN and PAIGE [this *Bulletin*, 1940, v. 37, 236] was seen. Re-examination of the brain tissues revealed the parasite described by WOLF, COWEN and PAIGE as *Toxoplasma*. Still later the tissues were further examined by BRUG and VOS, who described and figured the parasite from sections of the brain. *C. M. Wenyon*

BAMATTER, F. La toxoplasmose. [**Toxoplasmosis.**] *Ann. Paediatrici.* 1946, Dec., v. 167, No. 6, 347–50. [11 refs.]

The observations recorded in this paper concern premature twins of which the girl revealed hypothermia followed by fever, general rigidity, convulsions of the extremities, of the face and eyes and a certain degree of hydrocephalus, while the boy developed haemorrhagic enterocolitis. The girl died of her encephalitis on the 26th day and the boy on the 30th day. At post-mortem the brain of the girl revealed leptomeningitis and patches of necrosis in the brain substance, with a tendency to calcareous deposits. Both eyes showed chorio-retinitis, especially in the region of the macula. In the boy the intestinal ulcers were characterized by haemorrhagic necrosis. In sections of the brain and eyes of the girl typical toxoplasma were found. It is claimed that this is the first record of human toxoplasmosis in Europe. [A review of the literature, however, shows that JANKŮ (*Casop. tck. česk.*, 1923, v. 62, 1021) described the case of an infant in Prague who died at 16 months of age with marked hydrocephalus, microphthalmus, blindness, convulsions, anorexia and vomiting. Yellowish-white focal areas of chorioretinitis bordered by pigment occurred in the macular region. Microscopically the eye lesions showed an inflammatory process with cysts 20–30μ in diameter and containing numerous sporozoites. The case was identified by LEVADITI [this *Bulletin*, 1928, v. 25, 720], who examined JANKŮ's preparations of the eye, and by WOLF, COWEN and PAIGE [*ibid.*, 1940, v. 37, 236] as a case of toxoplasmosis. This would appear to be the first case of toxoplasmosis described in Europe.]

C. M. Wenyon

FREUDENBERG, E. Akute infantile Toxoplasmosis-Encephalitis. [**Acute Infantile Toxoplasmosis-Encephalitis.**] *Schweiz. med. Woch.* 1947, June 28, v. 77, Nos. 25/26, 680–82, 1 chart.

A child born in Basel rapidly developed symptoms which the author eventually attributed to toxoplasmosis, in spite of the fact that it was impossible to discover the organism. There was fever, encephalitis and chorio-retinitis. The cerebrospinal fluid gave a remarkably strong tryptophan reaction. Death occurred at 3¾ months. It is pointed out that the first case of toxoplasmosis to be recorded in Europe was described by BAMATTER in Switzerland. [See, however, the papers by DE LANGE, VOS, and BRUG and VOS, abstracted above and the reference to an earlier record of human toxoplasmosis in Prague given in the abstracter's square-bracket comment on BAMATTER's paper.]

C. M. Wenyon

ENTOMOLOGY AND INSECTICIDES: GENERAL

i. MARKS, Elizabeth N. **Studies of Queensland Mosquitoes. Part I. The** *Aëdes* (*Finlaya*) *kochi* **Group with Descriptions of New Species from Queensland, Bougainville and Fiji.** *Univ. of Queensland Papers. Dept. of Biology.* 1947, July 9, v. 2, No. 5, 66 pp., 20 figs. [34 refs.]

ii. ——. **Studies of Queensland Mosquitoes. Part II. New Species of** *Aëdes* **(Subgenus** *Finlaya*). *Ibid.* July 9, v. 2, No. 6, 10 pp., 3 figs.

i. In 1943 the Government of Queensland established a National Mosquito Control Committee, a function of which was to institute a research programme dealing with all aspects of the mosquito problem in Queensland. This paper is the first of a series concerned with the systematics and biology of these mosquitoes.

Aëdes (*Finlaya*) *kochi* is an efficient vector of *Wuchereria bancrofti* and several species have been confused with it. The object of the first paper is to clear up some of this confusion and it contains descriptions of the males of *A. kochi* and *A. wallacei* and of both sexes of four new species (*A. bougainvillensis, fijiensis, alocasicola* and *gahnicola*). There are also descriptions of the larvae of all the foregoing species and of *Aëdes solomonis* and of the pupae of all except *wallacei* and *fijiensis*. There are also notes on other species and keys for the identification of adults and larvae of this group. Important morphological details are figured.

ii. Two new species are described in this paper, *Aëdes* (*Finlaya*) *candidoscutellum* and *Aëdes* (*Finlaya*) *wasselli*. *H. S. Leeson*

THOMPSON, G. A. **A List of the Mosquitoes of Jamaica, British West Indies.** *Mosquito News.* 1947, June, v. 7, No. 2, 78–80. [15 refs.]

CAPPELETTI, R. Lucha contra insectos y roedores, sobre todo en los puertos y aeropuertos. [**Measures against Insects and Rodents in Ports and Airports.**] *Bol. Salud Publica.* 1945, Sept.–Dec., v. 5, No. 10, 47–58.

LORD, K. A. & JOHNSON, C. G. **The Production of Dermatitis by Pyrethrum and Attempts to produce a Non-Irritant Extract.** Reprinted from *Brit. J. Dermat. & Syph.* 1947, Nov., v. 59, 367–75.

Extracts of pyrethrum applied to the skin form one of the most effective repellents for mosquitoes and other insects. Unfortunately these extracts contain substances to which many people become sensitized after repeated applications and then an erythema or an intensely itching papular rash is produced. Among groups of 62 men and 27 women who applied a gum tragacanth cream containing a commercial extract of pyrethrum behind the ear each day for 4 to 10 weeks, 9·7 per cent. of the men and 25·9 per cent. of the women became sensitized. (The authors point out that the higher incidence in women is not statistically significant.) Where sensitization developed it was general; applications to the skin elsewhere produced a reaction. The factor responsible for the dermatitis does not appear to be pyrethrin itself. If pyrethrum extracts in petroleum ether are percolated through a column of fuller's earth, the dermatitis factor is more strongly adsorbed than the pyrethrins, and a preparation with less of the responsible factor can be obtained. But no extracts were prepared wholly free of the sensitizing substance. *V. B. Wigglesworth*

YATES, W. W. & GJULLIN, C. M. **Pre-Hatching Applications of DDT Larvicides on Floodwater *Aedes* Mosquitoes.** *Mosquito News.* 1947, Mar., v. 7, No. 1, 4–6.

Extensive areas bordering the Columbia River, U.S.A. (46 N. 120 W.) are flooded by the seasonal rise of the river and are the site of extensive breeding of *Aëdes vexans* (Meig) and *Aëdes lateralis* (Meig.). Plots in these areas were sprayed with a DDT emulsion (prepared by dilution with seven parts of water from stock containing 25 per cent. DDT, 68 per cent. xylene and 7 per cent. Triton X-100) before flooding was expected. Subsequently larvae failed to reach maturity over these treated areas and the authors found by experiment that an application of 3 pounds of DDT per acre will leave a residue in the soil nine months later, which is toxic to newly-hatched larvae, despite interim flooding on two occasions. *R. Ford Tredre*

INCHO, H. H. & DEONIER, C. C. **Comparative Toxicity of DDT to Three Representative Species of Mosquito Larvae.** *Mosquito News.* 1947, June, v. 7, No. 2, 67–70.

Laboratory tests of the toxicity of DDT preparations to three species of mosquito gave the following results (taken from tables) :—

DDT preparation	Concentration (p.p.m.) of DDT to give 86 to 96 per cent. kill in 24 to 48 hours of		
	Culex quinquefasciatus [*fatigans*]	*Anopheles quadrimaculatus*	*Aëdes aegypti*
1. Stable suspension	·025	·005	·0025
2. Stable emulsion	·025	·005	·0017
3. Acetone-water suspension ...	·025	·005	·0025
4. DDT in fuel oil	·05*	·005* [60 to 66·8 per cent. at ·0025 lb. per acre]	·025*

* lb. per acre.

It was observed that with preparations which spread equally through the body of the water, *Culex* was much more resistant than *Anopheles* or *Aëdes*. This must reflect a specific toxic effect. The *Anopheles* was also susceptible to preparations confined to the surface (oil solution and also dusts) but the *Aëdes* was protected by its feeding habit and therefore apparently resistant.

J. R. Busvine

HADAWAY, A. & BARLOW, F. **Toxicity of DDT applied to Limewash.** *Bull. Entom. Res.* 1947, Dec., v. 38, Pt. 3, 489–95.

Glass plates were painted with limewash (of stated composition) and subsequently sprayed with DDT solutions or emulsions. Tests were also done with pieces of limewashed plaster from houses. The insecticidal effects were determined by exposing tsetse flies (*G. palpalis*) or mosquitoes (*Aëdes aegypti* or *Anopheles gambiae*) to the treated surfaces for short periods, and observing the mortality twenty-four (occasionally forty-eight) hours later.

It was found that very low mortalities followed exposure to limewash treated with DDT as compared with glass surfaces similarly treated. This was not due

to chemical decomposition of the DDT, for the insecticide could be recovered and identified afterwards. Also it was shown that the amount adsorbed on the lime was negligible. The loss of toxicity is due to a simple masking effect owing to the particles of inert solid covering the DDT. A similar effect occurs with DDT emulsion, but not with a DDT dispersible powder, which remains on the surface of the limewash. With the last-mentioned formulation, however, there is a certain masking effect on a clean glass surface because of the inert diluents already present in the dispersible powder. (The one tested contained only 5 per cent. DDT.)

A few tests with a water paint containing DDT gave analogous results. Toxicity was low, because of masking of the DDT which was buried in the paint. An increase of the thickness of the paint layer, naturally enough, made no difference to the insecticidal effect. *J. R. Busvine*

BUSHLAND, R. C. **Comparative Tests with DDT and Phenothiazine against two American and Three New Guinea Species of Mosquito Larvae.** *Mosquito News.* 1947, Mar., v. 7, No. 1, 14–17.

Laboratory tests were done in Florida and in New Guinea in 1944 and 1945 with various species of mosquito larvae. The insecticides were added in acetone solution to large beakers and very fine (clear) suspensions were produced, to which the larvae were added.

The DDT was lethal at rates from one in 20 million to one in 150 million, for the different species. Towards *Culex quinquefasciatus* [*fatigans*], *Armigeres milnensis* and *Aëdes aegypti*, the DDT was about fifty times as toxic as phenothiazine [thiodiphenylamine]. Towards *Anopheles punctulatus* DDT was seventy times, and to *Culex annulirostris* DDT was 150 times, as toxic as the phenothiazine. *J. R. Busvine*

YOUNG, E. G. **Stability of Aerosol Formulations.** *Soap.* New York. 1947, Nov., v. 23, No. 11, 116–17, 152A.

In order to prevent decomposition of aerosols in metal containers it is desirable to add a small quantity of a compound which inhibits corrosion of the metal. This paper reports tests of various substances for the purpose. They were added to a normal aerosol (containing DDT and pyrethrins) and stored at 67°C. for several months with a strip of metal from the aerosol " bomb " container. It was found that 0·001 to 0·1 per cent. of propylene oxide, salicylal amino guanidine or certain other compounds very greatly reduced corrosion and decomposition of the aerosol liquid. At these rates, the additives were negligible in their effects on the insecticidal functions of the aerosol.

J. R. Busvine

FAY, R. W., COLE, E. L. & BUCKNER, A. J. **Comparative Residual Effectiveness of Organic Insecticides against House Flies and Malaria Mosquitoes.** *J. Econom. Entom.* 1947, Oct., v. 40, No. 5, 635–40, 3 figs.

Some new insecticides were tested for residual contact action against *Anopheles quadrimaculatus* and *Musca domestica*, with exposure of 15 to 60 minutes in small treated cages of plywood (3×3×12 inches). Mortality was determined after twenty-four hours in a clean cage. All substances (except pyrethrins) were tested at 100 or 200 mgm. per square foot. The order of effectiveness at the end of twenty-six weeks was (1) DDT ; (2) Benzene hexachloride (30 per cent. *gamma*) ; (3) Chlordane ; (4) Toxaphene ; and (5) DDD [Dichlor-diphenyl-dichlorethane]. The pyrethrins (at 10 and 1 mgm. per sq. ft.), with addition of piperonyl cyclohexone or piperonyl butoxide, had very little residual

effect. The relative toxicity of the different insecticides was the same for houseflies as for mosquitoes; but while loss of toxicity was abrupt with the former, it was gradual with the latter.

The effectiveness of a selection of commercial DDT wettable powders varied considerably, though all were applied at the same rate. *J. R. Busvine*

OKULOV, W. [**The Results of the Examination of the New Soviet Insecticidal Preparation, Pentachlorine Paste.** *Med. Parasit. & Parasitic Dis.* Moscow. 1947, v. 16, No. 1, 33–5. [In Russian.]

The author reports promising results of tests carried out under laboratory conditions with a new Soviet insecticide "pentachlorine paste", which contains 40 per cent. DDT. A 10 per cent. aqueous emulsion of the paste was sprayed on various objects; 10 mgm. of pentachlorine per 1 cub. m. of surface was used. On drying, the treated surfaces showed no trace of the substance applied. A narrow glass ring was then attached to the treated surface. Within it were placed the insects, and the ring was covered with a glass plate. After a certain period of time, the insects were removed into a test tube and observations were made on their behaviour. These tests were carried out with sandflies, mosquitoes, flies and bugs. Sandflies and flies proved to be the most susceptible to the action of the preparation, contact during 5 minutes being sufficient to destroy them within 5–8 hours. In the case of mosquitoes, contact for 50–55 minutes was required to kill them after 30–31 hours. Bugs required longer contact, after which they perished in 8–15 hours. The duration of contact and the interval before death increased when the insects were exposed to surfaces which had been sprayed from 10 to 45 days previously. The advantages of the new insecticide are its prolonged effect upon insects, the absence of any traces of its use on the treated surface, its complete innocuousness for animals and human beings, and the small amounts required for use in dwellings. [There does not appear to be anything new in the principle, which is an adaptation of DDT.] *C. A. Hoare*

FREAR, D. E. H. & SEIFERLE, E. J. **Chemical Structure and Insecticidal Efficiency.** *J. Econom. Entom.* 1947, Oct., v. 40, No. 5, 736–41.

LABORATORY PROCEDURES

ROGERS, E. W. **A Colorimetric Method for the Quantitative Determination of Bilirubin in Urine.** Reprinted from *Bull. Inst. Med. Lab. Technol.* 1947, July–Aug., v. 13, No. 4, 55. [10 refs.]

CRANDALL, B. S. **Removal and Prevention of Fungus Stain of Photographic Negatives in the Tropics.** *J. Biol. Phot. Ass.* 1947, Dec., v. 16, No. 2, 78–80.

In the tropics, photographic negatives, stored in boxes or open drawers, may rapidly deteriorate by becoming covered with fungus mycelium. The problem can be solved for 35 mm. film negatives by storing them with silica gel in tins which can be hermetically sealed. For larger negatives this method is impracticable. In the Amazon region, it was found that immersion in the standard fixing bath "hypo" for five to ten minutes cleared the stain from the negative, and that the solution acted as a fungicide. Negatives so treated remained free from fresh infection for four months. Negatives have been protected from

fungus infection for ten months by immersing them in a 1 in 1,000 solution of mercuric chloride immediately after washing, or in a solution of "Lignasan" containing 2·4 gm. per litre.

[Lignasan is ethyl mercuric chloride.] *G. M. Findlay*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

MANSON-BAHR, P. **The Practice of Tropical Medicine in London.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Dec., v. 41, No. 3, 269–94, 1 chart, 2 diagrams & 4 figs. on 1 pl.

The Presidential Address at the opening of a Session of the Royal Society of Tropical Medicine and Hygiene offers scope for a wide variety of reflections on diseases of warm climates, or for a summing up of personal experience. In the latest of these addresses, Sir Philip Manson-Bahr has chosen the latter course, and presents a series of observations on tropical diseases as he has seen them during more than a quarter of a century of practice in London. His emphasis throughout is on the unusual, the atypical, and on the need for thorough examination of each patient and for judgment when the seemingly obvious diagnosis is not quite right. The address is, in fact, an account of a series of diagnostic puzzles ; it was given with the verve and liveliness characteristic of the author's speeches.

It would not be possible to abstract this paper satisfactorily, and the reader is advised to study the original, and then perhaps to ponder on the possible missed diagnoses of his own experience, the tumour of the left kidney mistaken for a spleen, the high remittent temperature due to unsuspected ischio-rectal abscess, the rectal carcinoma which is in fact an amoeboma, the cholecystitis which turns out to be sprue.

The impression left upon one member of the audience is that medical men in Britain, called upon to treat patients from the tropics, should be particularly careful not to overlook tropical diseases in differential diagnosis, and also that those accustomed to look for tropical diseases should not overlook non-tropical conditions. Medicine is difficult enough in temperate climates, but tropical conditions make it more so ; yet if there were no difficulty there would be no skill, or need for knowledge and judgment. Sir Philip Manson-Bahr begins his paper by referring to the supreme importance of judgment. Judgment, no doubt, is a gift, but it can be cultivated, and it is evident that to improve it the doctor must learn from his own experience, and to do this must follow up his cases. *Charles Wilcocks*

MANSON-BAHR, P. **The Manson Tradition.** *J. Trop. Med. & Hyg.* 1947, Dec., v. 50, No. 12, 238–43. [13 refs.]

The Manson tradition needs no bush ; but as continuity is the essence of history, it requires constant renewal for each generation if its freshness is to be maintained.

To restate the tradition of the Father of Tropical Medicine, no one is better equipped, in status and in qualifications alike, than Sir Philip Manson-Bahr himself : for he is as closely linked to that tradition as the tradition is linked to him.

In this paper, Sir Philip recapitulates some of the outstanding features of Manson's life, achievements and outlook, and illustrates them with vivid personal memories which strikingly reveal the greatness of the man and of his work.

Stress is laid on his broad approach to scientific problems : though sometimes unorthodox according to modern conceptions, " in his hands they proved, as results have shown, to be eminently successful ". Indeed, history has shown that many now classical achievements by others in the field of tropical medicine had their origins and background in Manson's hypotheses and in his " prophetic instinct ".

Manson was a clinician who saw the paramount importance of preserving the clinical aspect of medicine, whatever other specialized forms it might take : and he trained himself, when no others existed to train him, in those specialized fields. He was, above all, a teacher : but he was " no hidebound doctrinaire. His outlook was broad : he was well versed in literature and possessed more than superficial acquaintance with other branches of science and natural history ".

Passing from Manson himself to the wider fields which he had laid open, the author corrects any impression that the wells of tropical research have been exhausted : during the last six years alone, the opportunities given to many eager workers in wartime have borne great fruit : examples are given of new additions to our knowledge of tropical medicine ; epidemic polyarthritis, epidemic thrombo-phlebitis, kwashiorkor, tropical eosinophilia and cardiology in the tropics are mentioned ; much new light has been thrown on the transmission and control of insect-borne disease ; treatment and prevention have been enriched by modern methods, technique and drugs ; and, especially, many preconceived theories of the physiology and pathology of well-known diseases, for example blackwater fever, malaria, cholera and heat-stroke, have been shown to be untenable.

The author concludes by showing how tropical medicine, despite its great gains in wartime, has itself suffered from the ravages of war ; and he enters a plea for the preservation and reconstruction of materials and means of teaching on the same high standard hitherto maintained. A suggestion is put forward for the foundation of some form of organized association—the name " the Manson Association " is suggested—which would preserve the Manson tradition, voice its own views and opinions, knit more closely in fellowship those teaching and working in tropical medicine and perhaps institute a regular Manson lecture. Such an organization might also institute a central pool for building up a depository of pathological specimens and other material.

If the prestige of British Tropical Medicine is to be preserved in a changing world, its devotees require to be bound more closely in their common task ; and for this purpose there could be no greater or more appropriate central figure around which to rally than that of the Father of Tropical Medicine himself.

H. J. O'D. Burke-Gaffney

HAMBURG. Tätigkeit und Aufgaben des Hamburger Tropeninstituts. [**Activities and Aims of the Tropical Institute, Hamburg.**] 36 pp. 1947.

The Institut für Schiffs- und Tropen-Hygiene, now the Tropical Institute, Hamburg, was founded by Bernhard Nocht in 1900, with the following objectives in view : (1) The treatment of exotic infective diseases and diseases of warm climates. (2) Research on a wide basis in tropical medicine and hygiene. (3) Education and instruction of doctors, students, laboratory workers and others in tropical diseases, parasitology and epidemiology.

In the latter years of the late war, much of Hamburg was devastated by bombs and by fire and the Institute suffered severely, but it is rising, phoenix-like, from its ashes and this booklet explains what has been done for renewing its work. It embraces the following sections : Clinical (under Professor Nauck), helminthological (Professor Reichenow in charge), entomological (Dr. Weyer), chemical (Dr. Kessler), bacteriological (Dr. Lippelt), pathological and virus

research (Professor Nauck), veterinary (Dr. Enigk), epidemiology (Professor Nauck). In addition, there is an animal house for the usual small laboratory animals—mice, guineapigs, rats, rabbits, birds, cats and dogs—and later there will be accommodation for larger animals, horses, pigs, sheep, etc.

Courses of lectures are given by the various heads of departments in their different specialities. The books of the library, though removed to the basement in the war, were mostly destroyed by bombs and by fire, but attempts are being made to replace lost books and papers. Finally, there is to be, as of old, a museum for demonstration of photographs and specimens.

The booklet gives the titles of 31 papers published from the Institute since 1945 ; of 25 more at present in the press and 18 in preparation. [It will take a long time and will be a difficult uphill task to bring the new Institute to the standard of the old which, as older workers in tropical medicine will remember, was one of the finest in the world.] *H. Harold Scott*

BOOK REVIEW

MARTINI, E. **Lehrbuch der medizinischen Entomologie.** [Textbook of Medical Entomology.] 3rd Edition. pp. xvi+633, 322 figs. 1946. Jena: Verlag von Gustav Fischer. [Rm. 29.]

The first edition of Professor Martini's textbook on medical entomology, was published in 1923 [see this *Bulletin*, 1923, v. 20, 766], the second edition in 1941, and the present volume in 1946. The third edition follows a plan similar to that of the first edition (the reviewer has failed to obtain a copy of the second edition) and maintains the same high standard as a guide to those interested in the part played by arthropods in causing disease in men and animals. That a book of so considerable a size—there are about 600 closely printed pages—is no more than a guide to medical entomology, is the outcome of the author's inclusion of accounts of arthropods of mainly, and often solely, veterinary importance ; the space available for the title subject is further reduced, by descriptions of the morphology and life-cycle of the parasites carried by the vectors, not only during their development in the invertebrate host, but also during their sojourn in the vertebrate. Professor Martini stresses in his preface, the difficulties under which he laboured while writing this third edition, and it is significant of these difficulties, rather than a reflection on the author, that he makes but little reference to important recent advances in our knowledge of medical entomology. This lack of modernity is illustrated by an examination of the bibliography, where, out of nearly 1,000 references, the reviewer has encountered only forty-one, thirty-nine of which are in German, concerning papers published after 1939.

The paper used in making this book is of exceptionally fine quality, and does full justice to the many excellent illustrations. The price, Rm. 29, appears more than reasonable ; indeed, it is doubtful whether, at the present time, an equally well produced volume could be published in Britain at a similarly low price. *R. M. Gordon*

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